

Transitions of Control: ADS Data Elements Illustration

FRAV/VMAD/EDR/DSSAD Complementarity

Transitions of Control: FRAV draft provisions (subject to change)

- An ADS which permits a transition of control shall be designed to ensure safe **transitions of control**. *(4.2.5.)*
- “Transition of control (TOC)” means a procedure by which the ADS engages the **fallback user** in dynamic control of the vehicle such that the fallback user assumes the role of **driver** upon completion. *(2.18)*
- “Fallback user” means a user designated to assume the role of driver upon completion of a transition of control. *(2.9.)*
- “Driver” means a qualified human being engaged in dynamic control of the vehicle. *(2.5.)*

Commonality of transition steps

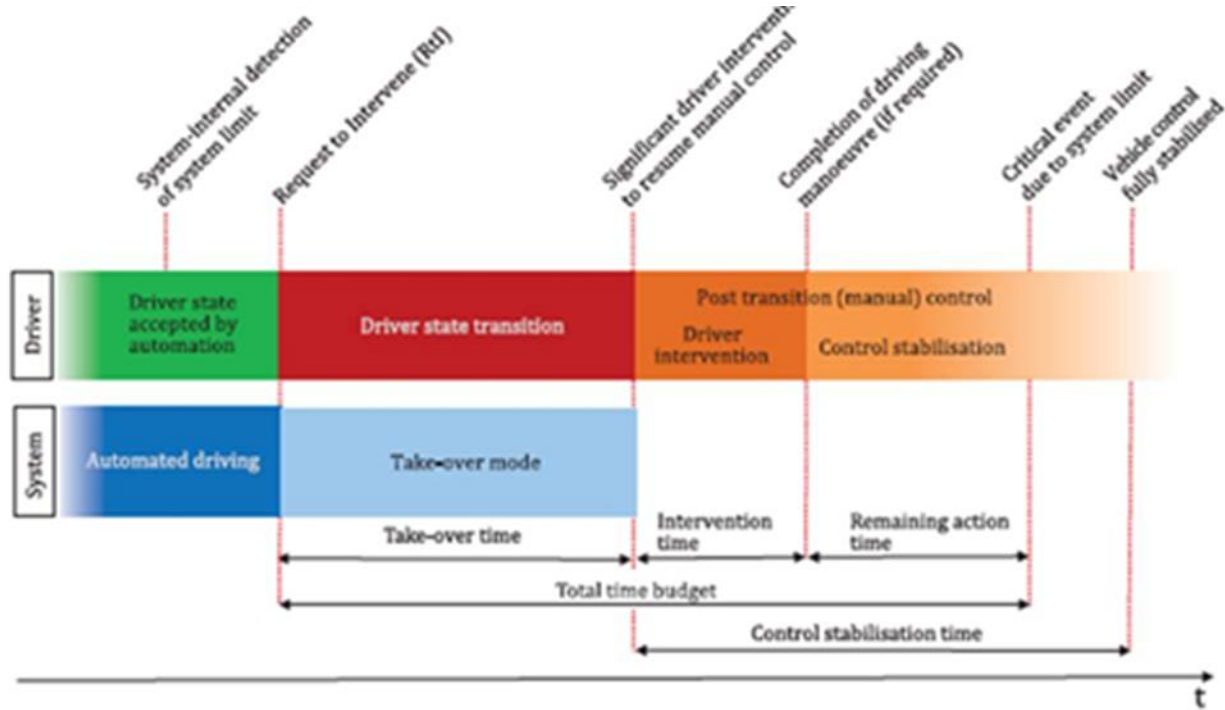


Figure 2 — System-initiated transition from automated to manual driving

The interaction shall follow a common sequence of actions and states in the transition of control (change of user roles)

Logically Derived TOC aspects

- TOC trigger (something initiates transition sequence)
 - User intervention
 - ODD exit
 - System fault } Only these triggers initiate a transition demand from the ADS.
- Transition demand issued if ADS initiated TOC
- Evaluation of user inputs (verification of stable control)
- TOC completed

Transition sequences will differ. A transition can be initiated by a user intervention or by the ADS (transition demand). ADS would obviously not issue a transition demand when the user triggered the TOC and is already intervening. A transition may or may not be successful.

Sequence Elements Raised in FRAV Discussions

- User intervention
- ODD exit condition
- DDT-critical fault
- Advance transition notifications
 - Delayed user response
- Transition demand
- User input verification
 - Inadequate or no user response
- Delayed response to user intervention due to safety condition
- TOC complete
- Fallback to minimal risk condition

FRAV has discussed possible elements that could (but would not necessarily) arise during transitions of control. The presence and order of such elements would describe each TOC as it played out.

Data Elements Considerations

- TOC only applicable to ADS designed for use with a fallback users.
- TOC involve identifiable steps or elements, but TOC sequences differ depending upon conditions and user responses.
 - User or ADS initiated
 - Advance notifications
 - Adequate or inadequate user inputs
 - TOC may be unsuccessful requiring fallback to MRC
- Objectives and use of data differ between EDR and ISMR
 - EDR for crash analysis by safety authority (e.g., specific elements of TOC sequence relevant to causation chain).
 - ISMR involves manufacturer reporting of performance metrics (e.g., frequency of unsuccessful TOC).
- Nonetheless, data elements may be identical for EDR and ISMR

Complementarity Across Informal Groups

- EDR/DSSAD can propose data elements.
- FRAV can propose safety specifications.
- VMAD can propose performance metrics.
- Each group can benefit from the views of the others.
- The critical need is to ensure consistency and alignment.
 - Terms and definitions
 - Data elements and requirements for ADS behaviors and actions
 - Data elements should enable reporting on performance metrics