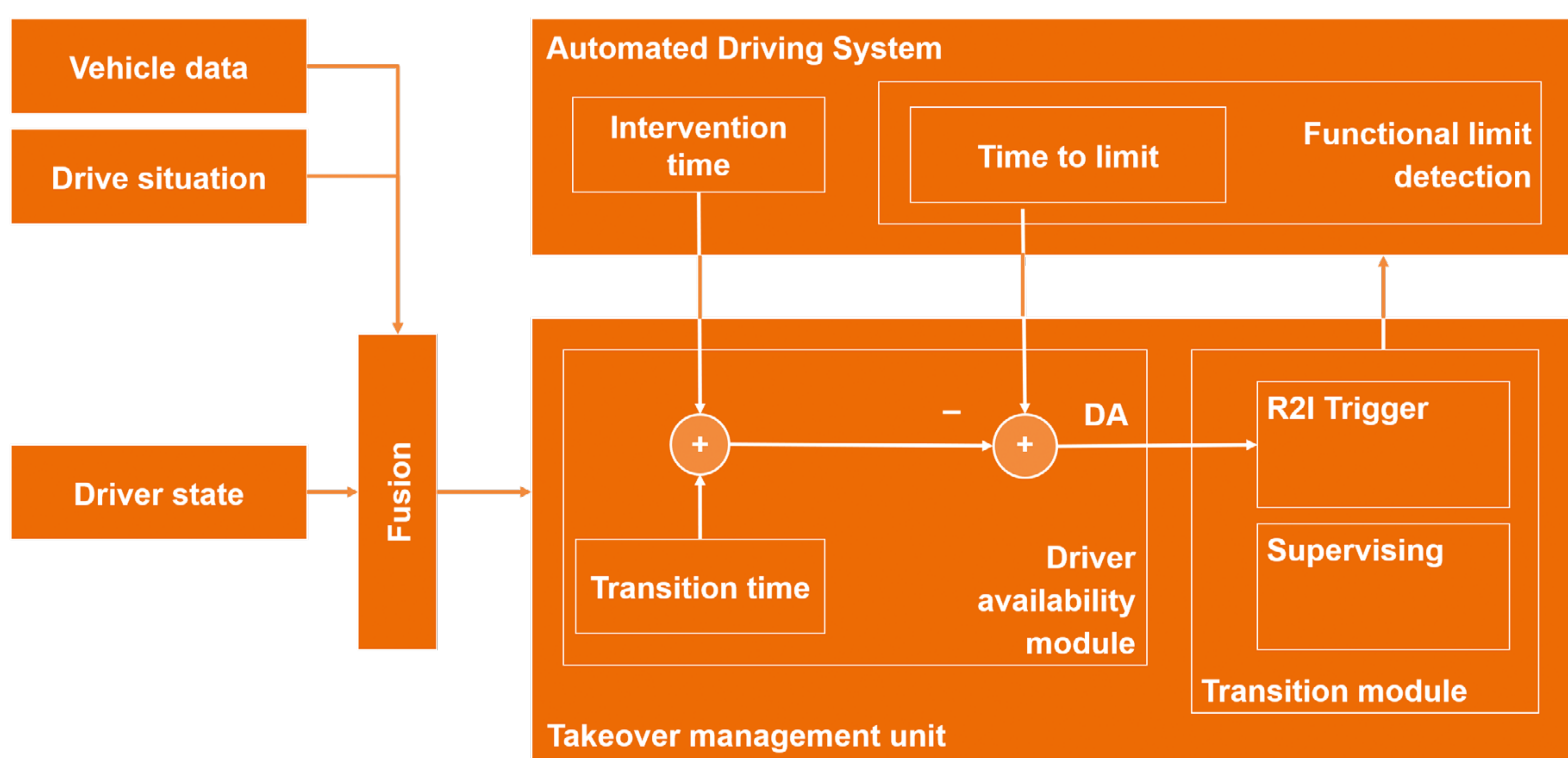


# Concept and Role of the Takeover Management Unit

## POSITIONING OF THE TAKEOVER MANAGEMENT UNIT

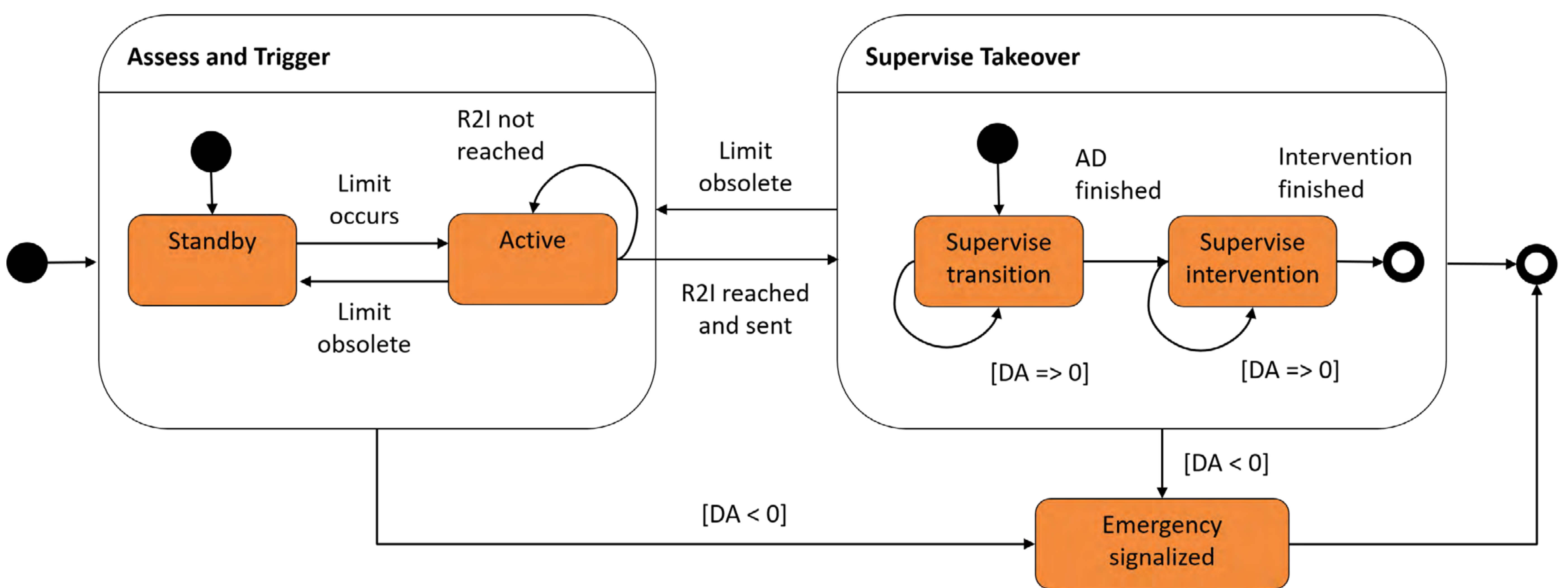
The determination of driver availability (DA) is critical and must be calculated based on dynamic models of both the driver and driving systems. Once a functional limit is detected, the driving system continuously updates the time to reach the limit and the time required for a potential intervention. The takeover management unit (TMU) also receives the fused data, determines the transition time and subsequently delivers the DA which causes the multi-stage R2I. The driver's behavior while transitioning gets supervised to detect anomalies at early stages.



The takeover management unit and driver state monitoring complements the automated driving system to become a highly and fully automated driving system. The driver availability needs to be determined continuously to reflect the changes in the input data and to readjust takeover timings while approaching the function limit.

## OPERATION OF THE TAKEOVER MANAGEMENT UNIT

The operation of the TMU is separated during the time before and after the final R2I, in "Assess and Trigger" and "Supervise Takeover" state, respectively. The TMU's state remains in standby mode until a functional limit occurs. In its active state, the TMU renders the pre requests. Once the final R2I is sent the takeover is supervised. First the transition takes place and when the automation is turned off, the intervention may be tracked to confirm timely behavior of the driver. Meanwhile the DA is updated continuously to test for sufficient leeway for the takeover. In case of negative driver availability the TMU needs to signal an emergency alert to the driving system.



The state chart of the takeover management unit. The left side of the chart, "Assess and trigger" include states before, while the right side, "Supervise takeover", shows states after the R2I. If Automated Drive (AD) is finished or an emergency occurred with negative Driver Availability ( $DA < 0$ ), the operation of the TMU is terminated.