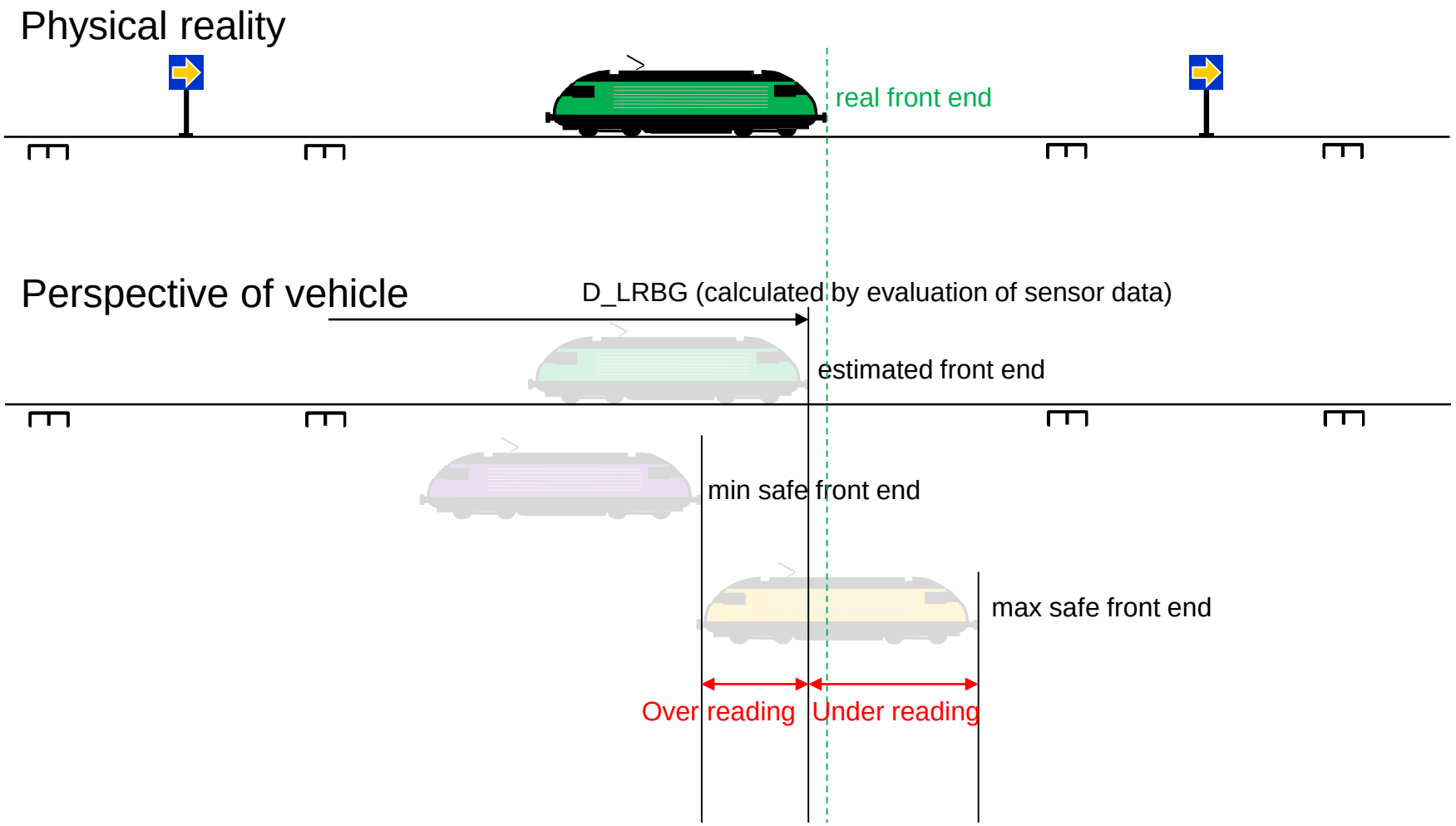
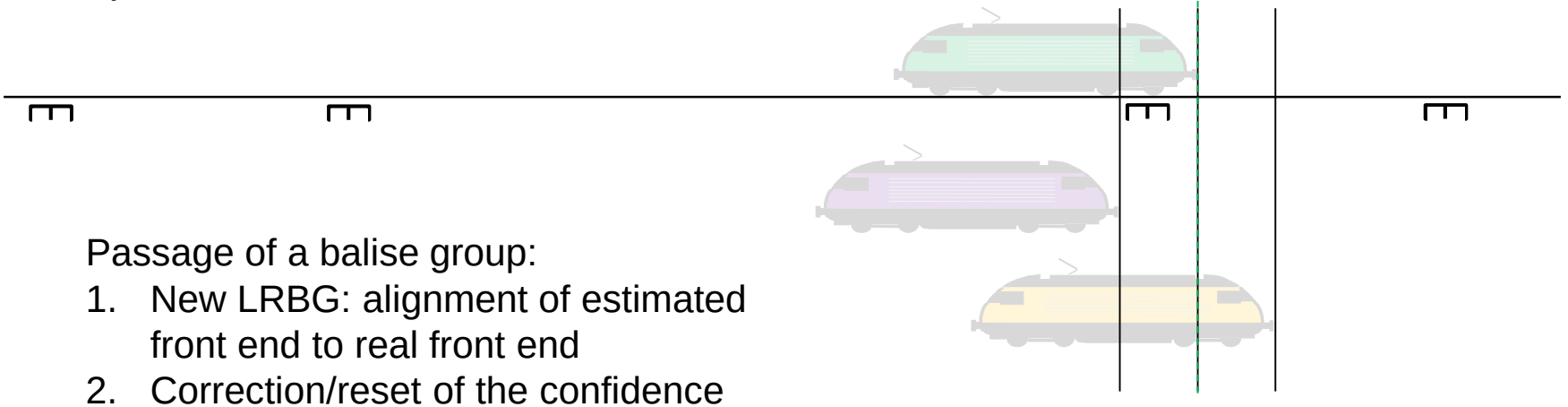
ETCS Odometry



Passage of a balise group

Physical reality

Perspective of vehicle



Passage of a balise group:

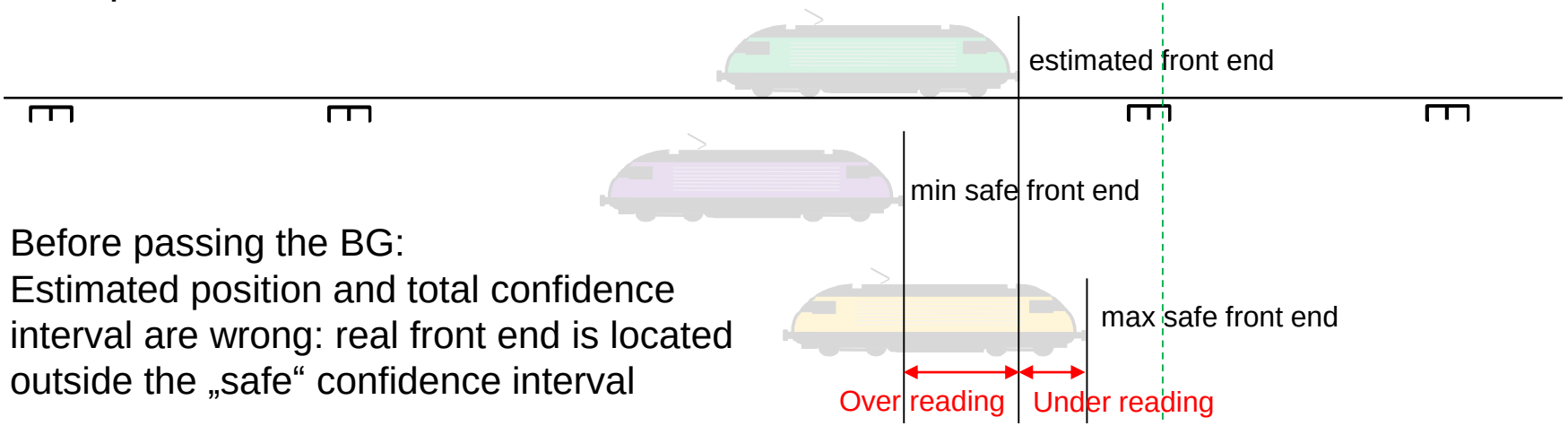
1. New LRBG: alignment of estimated front end to real front end
2. Correction/reset of the confidence interval (location accuracy of the BG + small tolerances)

Accurate DMI and supervision when signal corresponds to an end of authority EoA

Odometry fault: Real front end outside conf. interval

Physical reality

Perspective of vehicle



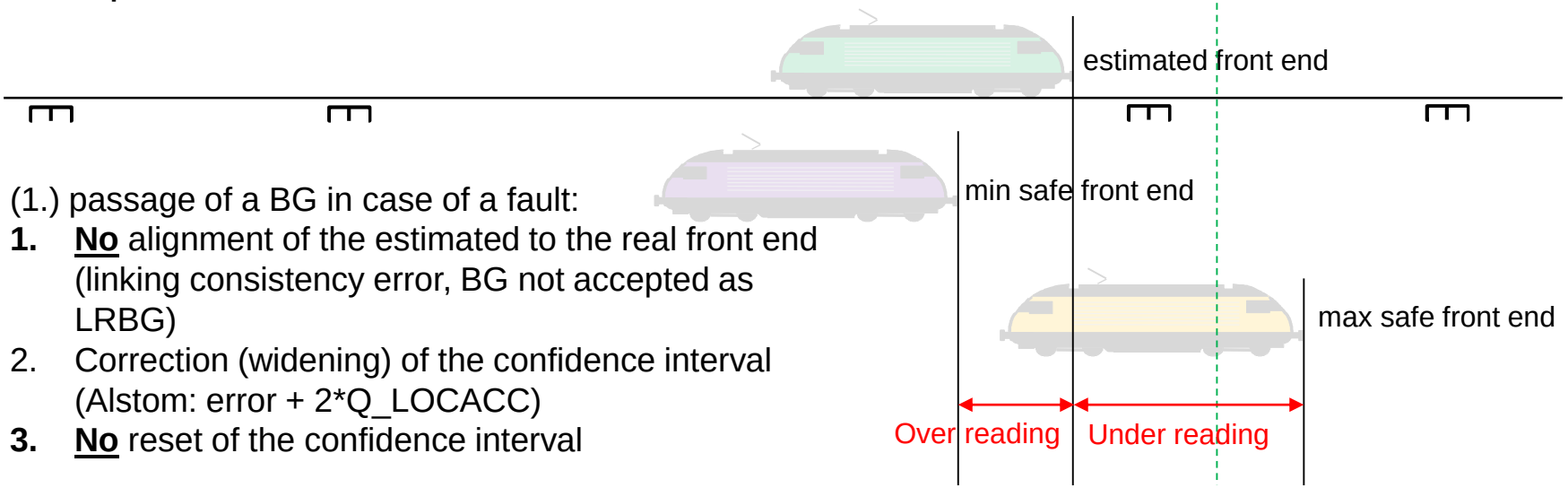
Before passing the BG:
Estimated position and total confidence interval are wrong: real front end is located outside the „safe“ confidence interval

Tolerable hazard rate for ETCS onboard: ca. 10^{-9}/h (SIL 4); SUBSET-091, V2.5
Fulfilling the requirement would roughly allow 1 event every 1000 years on L2 lines in CH
Observations/Monitoring: **100+ events per year**

Odometry fault: Passage of balise group

Physical reality

Perspective of vehicle



(1.) passage of a BG in case of a fault:

1. **No** alignment of the estimated to the real front end (linking consistency error, BG not accepted as LRBG)
2. Correction (widening) of the confidence interval (Alstom: error + 2*Q_LOCACC)
3. **No** reset of the confidence interval

Supervision and timely issue of EB not possible when driver surpasses EoA in RS
Danger point behind the signal is reached with high probability unless overlap is large