



Test Rig Synchronization for Dynamic Tests on deploying DPPS

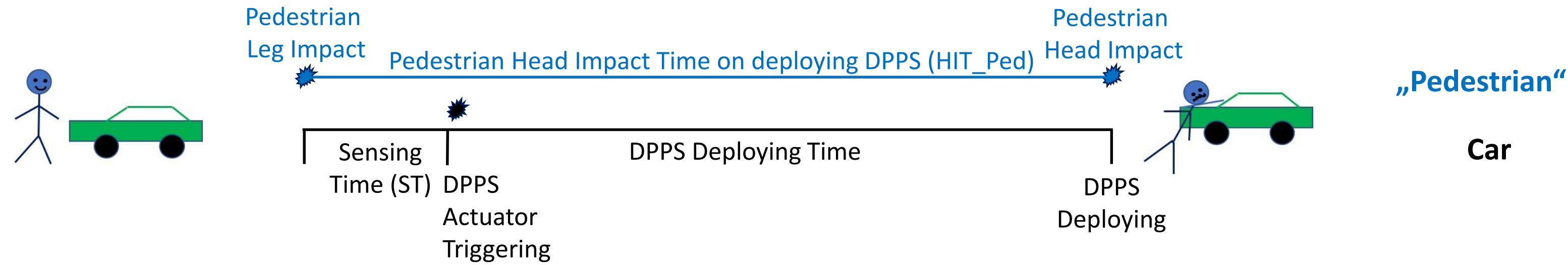
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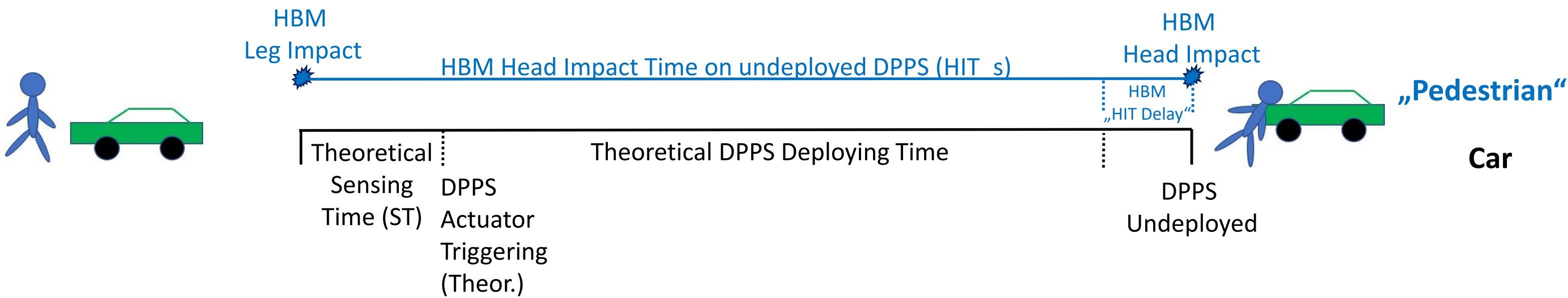
Dirk-Uwe Gehring | BGS Boehme & Gehring GmbH

Test Rig Synchronization for „Dynamic“ Headform Testing

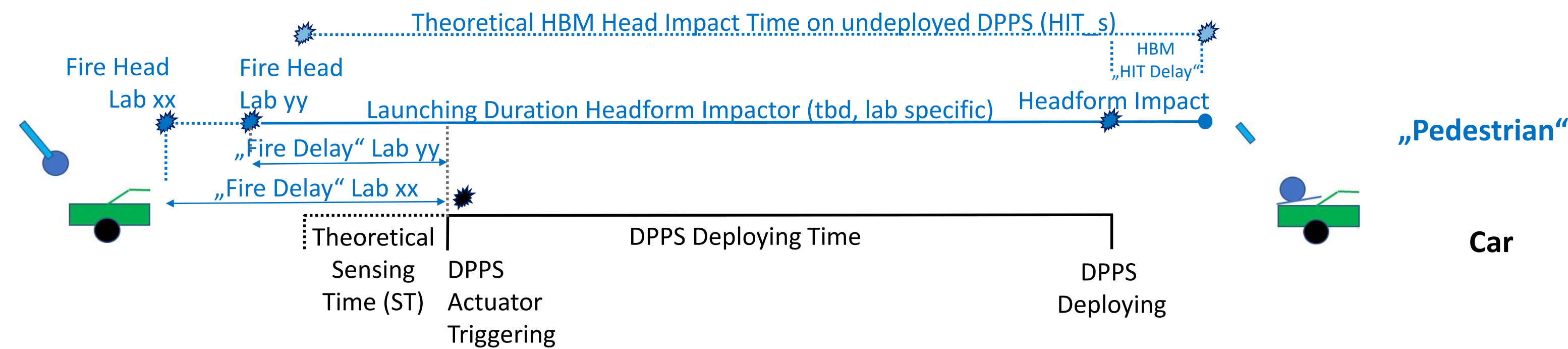
Real Life*



HBM Simulation*



Impactor Testing



* Assumption:
Identical trajectories, kinematics of Pedestrian and HBM

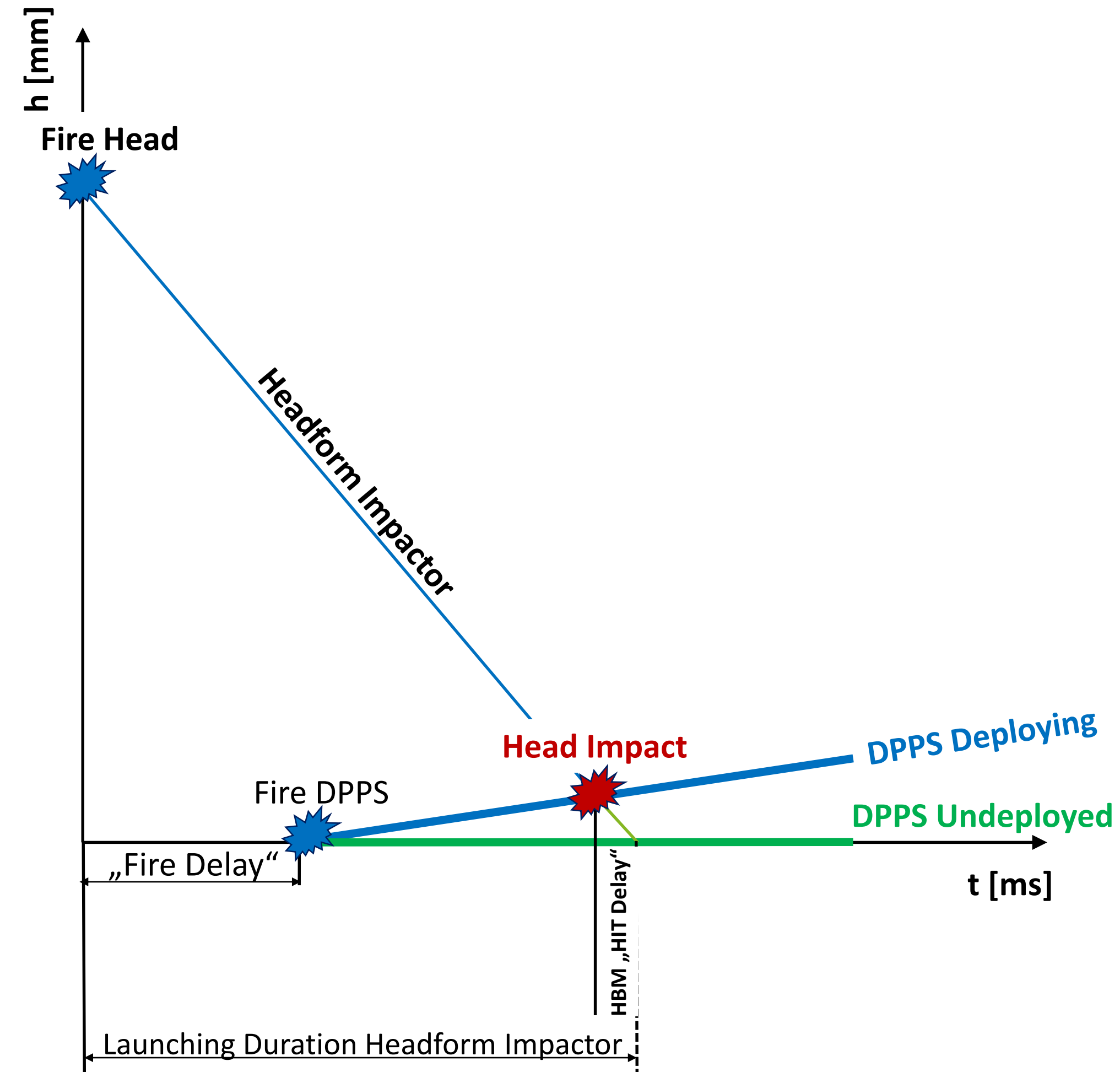
„Fire Delay“ = Launching Duration Headform Impactor – (DPPS Deploying Time + HBM „HIT Delay“)

„Fire Delay“ = Launching Duration Headform Impactor – (HIT_s – ST)

Launching Duration Headform Impactor: tbd, lab specific
DPPS Deploying Time = HIT_s – ST – HBM „HIT Delay“
HBM „HIT Delay“ = HIT_s – HIT_Ped (unknown)

NOTE:
Launching Duration Headform Impactor refers to DPPS in the undeployed position. Due to the DPPS deployment while testing, the actual launching duration will deviate!
(Time difference: compare diagramme on next slide)

Effect of DPPS Deployment on Launching Duration Headform Impactor (Example)



Proposal as endorsed by SG „Rig Diagramme“ – Preamble

295. For the dynamic test option, the IWG investigated possible misinterpretations of the calculated and actual launching time of the headform impactor during dynamic tests.

Since the fire delay between the initiation of the launch of the headform and the triggering of the DPPS actuators is, amongst other things, based on the HIT of the HBM on the undeployed DPPS (HIT_s), but the actual headform impact takes place on the deploying DPPS (see Fig. 1 (a)), the actual launching duration will deviate from the calculated one, as depicted in Fig 1 (b).

This needs to be taken into account in the course of verification of ambient conditions for dynamic tests.

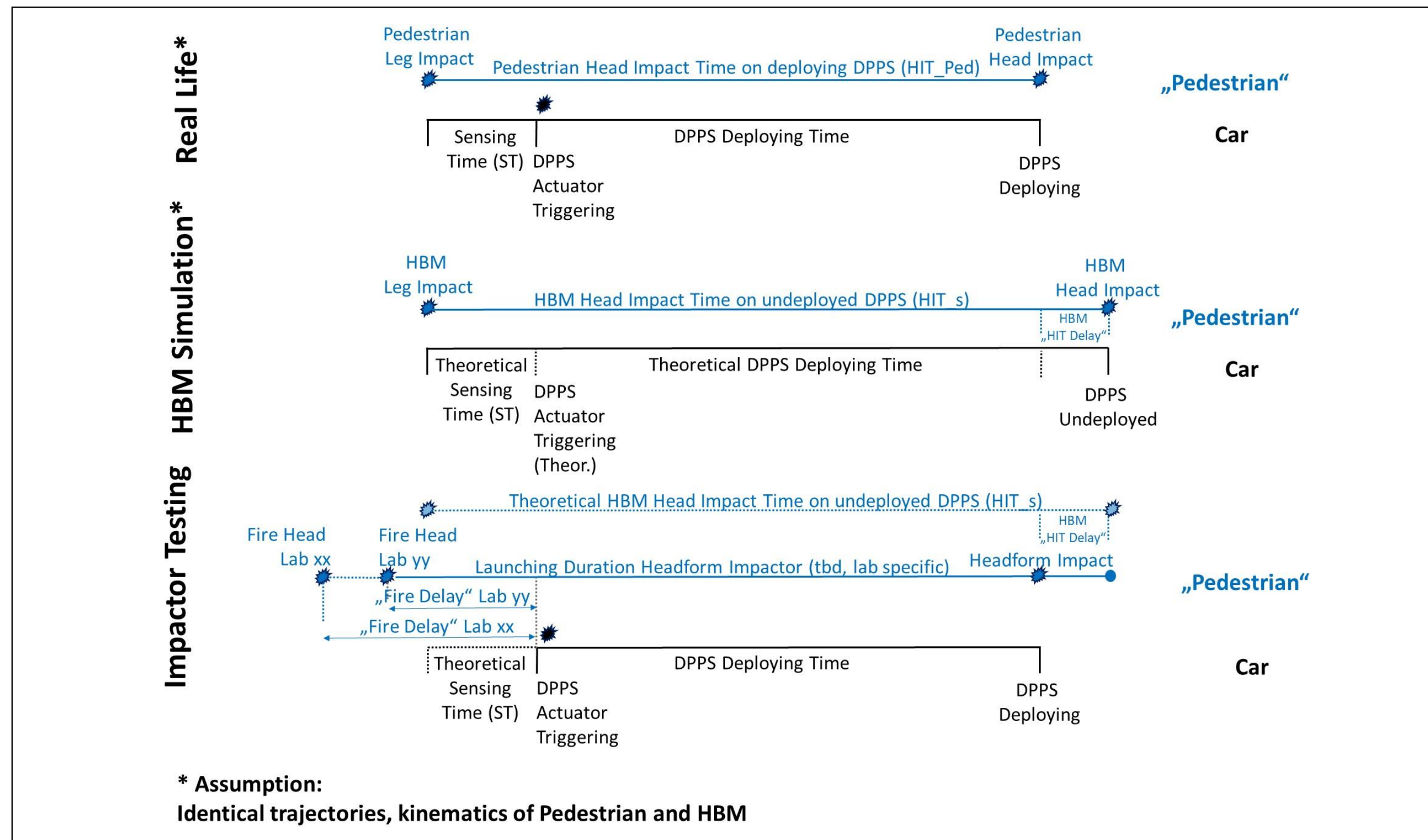


Fig. 1 (a): Transfer of real life accident situation with deploying DPPS to ambient conditions for impactor testing.

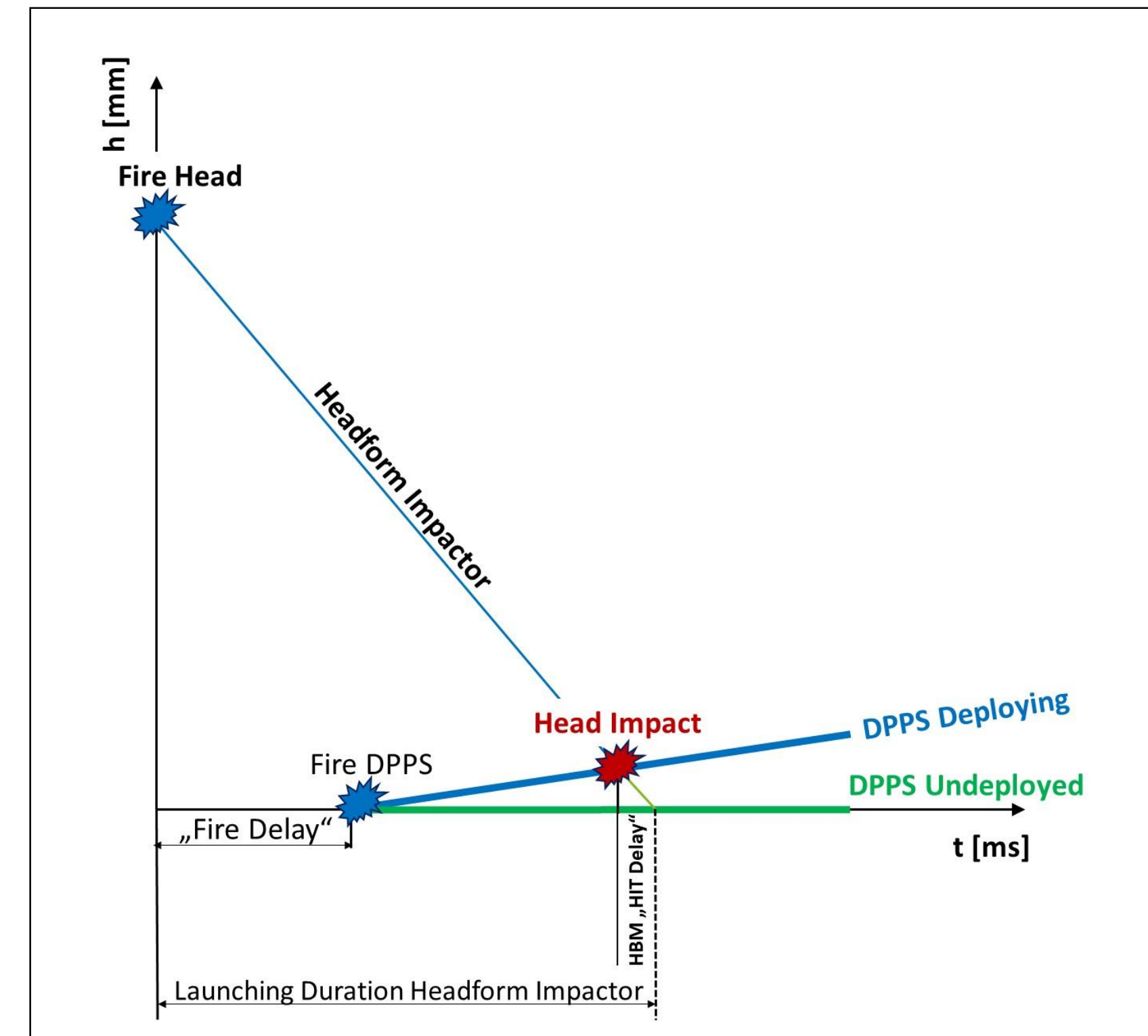
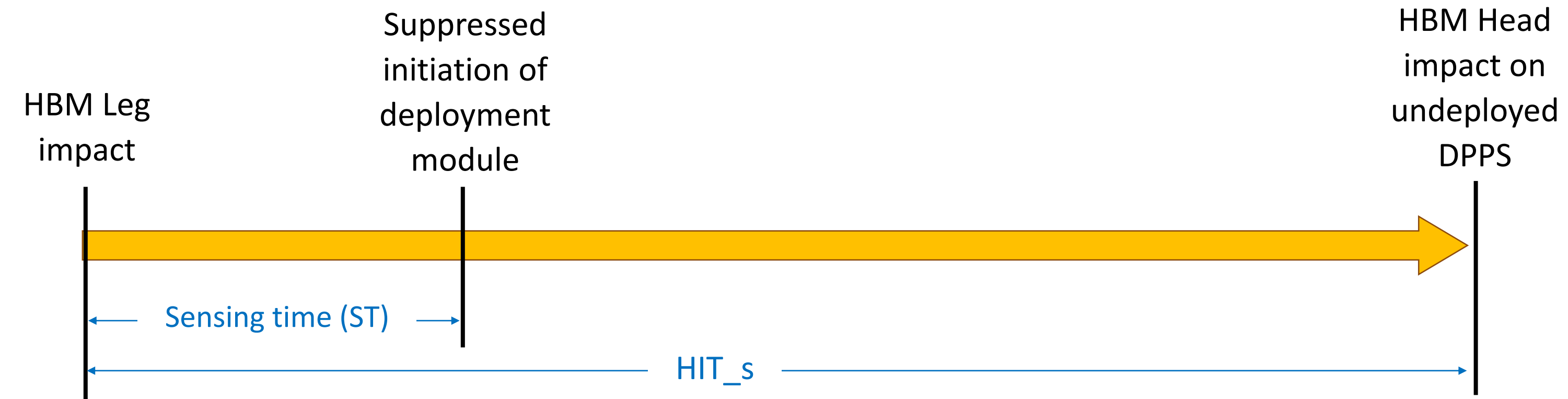


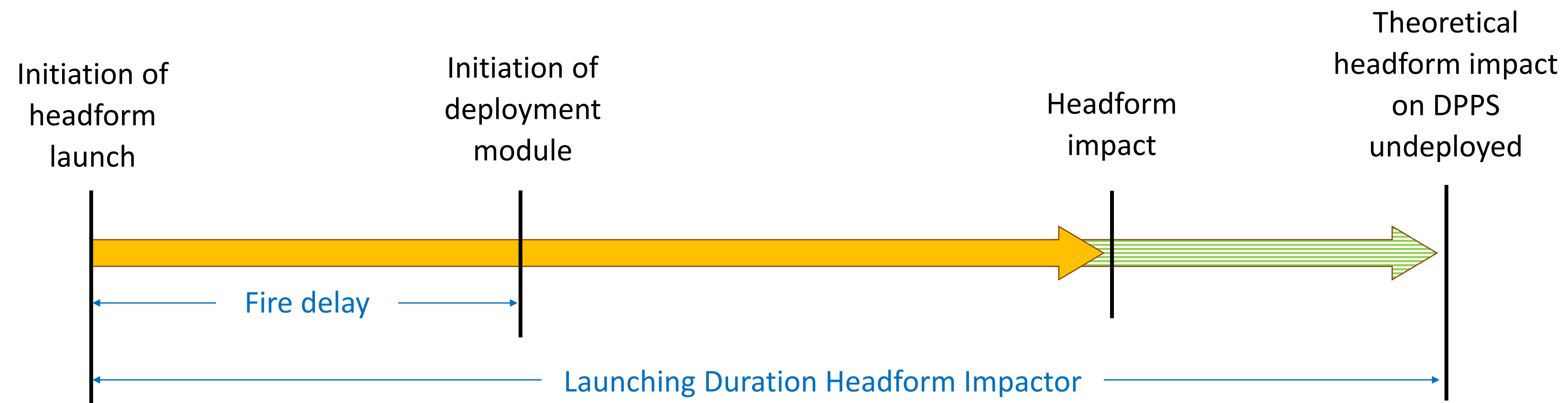
Fig. 1 (b): Effect of DPPS Deployment on Launching Duration Headform Impactor (Example).

Synchronization of Test Rig and DPPS Deployment (Example)

Timeline of HBM simulation:



Timeline of dynamic test:



$$\text{Fire delay} = \text{Launching duration headform impactor} - (\text{HIT}_s - \text{ST})$$

4.2.1.3. Fire Delay

The test facility shall ensure that the head impact occurs at the correct time relative to the deployment of the DPPS, taking into account the HIT_s for the corresponding WAD of the head impact point from Figure 1-3 and ST , as shown in the example in Figure 1-4 (a) below.

„Fire Delay“ is the elapsing time between the initiation of the headform launch and the initiation of the DPPS deployment module. It is determined according to the equation: $Fire\ Delay = Launching\ Duration\ Headform\ Impactor - (HIT_s - ST)$.

The “Launching Duration Headform Impactor” is rig-specific and is the time period between launching of the headform impactor and the theoretical time of head impact on the undeployed DPPS. Due to the DPPS deployment during testing, the *actual* launching duration of the headform impactor is expected to differ from the launching duration headform impactor (time difference: see example in Figure 1-4 (b)).

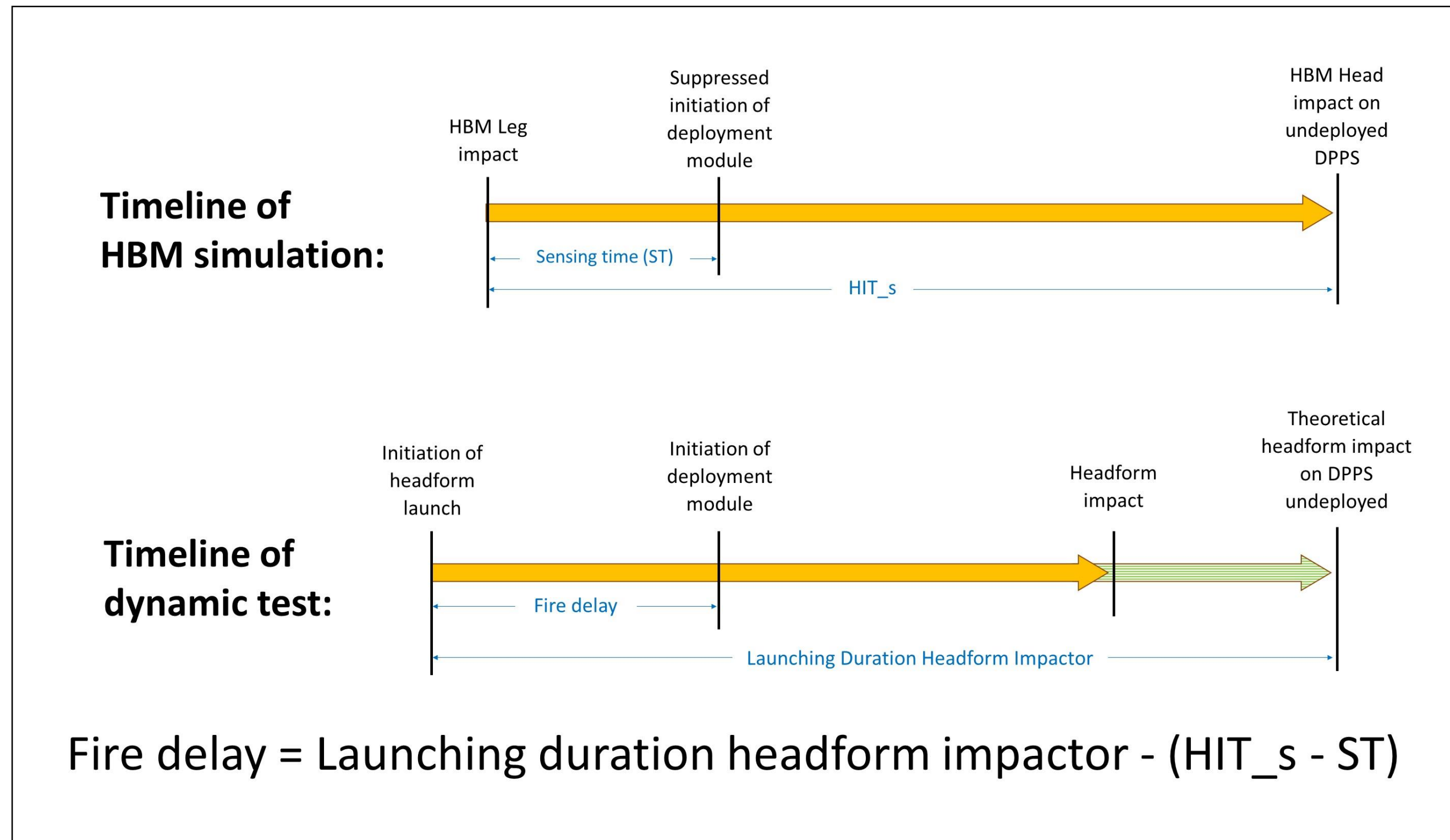


Fig. 1-4 (a): Synchronization of Test Rig and DPPS Deployment (Example).

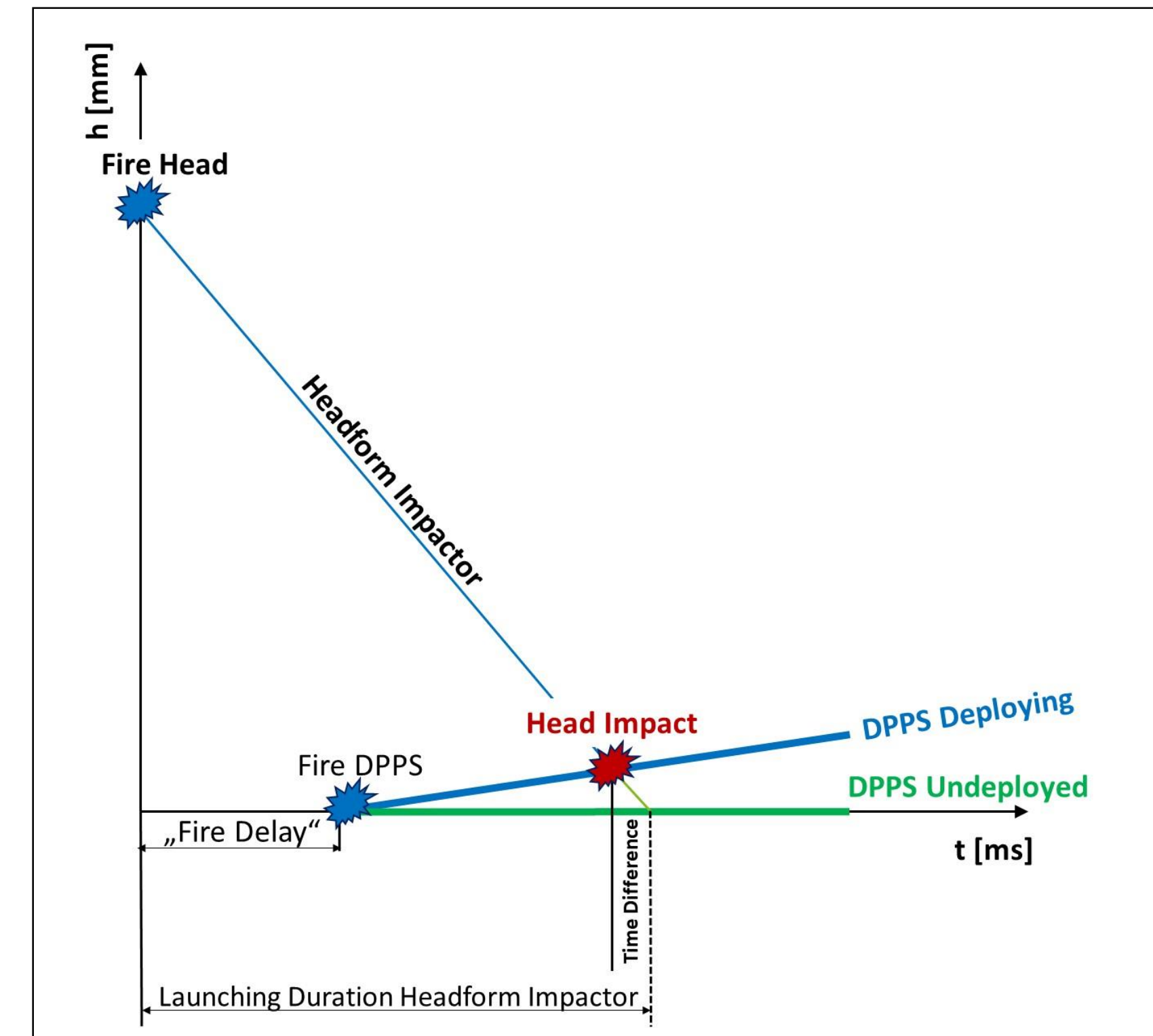


Fig. 1-4 (b): Effect of DPPS Deployment on Launching Duration Headform Impactor (Example).

Thank you for your attention!

**We look forward to our
discussions.**

