WP3 – G1　Paris – St Ouen Meeting Report

openETCS@ITEA2 Project

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Paris-St Ouen Dec 9-11, 2014

AGENDA

Agenda

Tuesday, Dec 9 Room S_6056

12h00 – 13h30: lunch time

13h30 – 17h30 With Jakob and Baseliyos

- Agreement on the objectives for the workshop

- Perimeter of the analysis

Wenesday, Dec 10 Room S_6056

9h00 – 9h30 : quick presentation of Benjamin Scade Model

9h30 - 10h00: quick presentation of Christian Document

10h00 – 10h30: quick presentation of Véronique ch13 analysis

Agenda

Wenesday, Dec 10 Room S_6056

11h00 – 13h00: technical issues

13h00 – 14h00: lunch time

14h00 – 18h00: technical issues

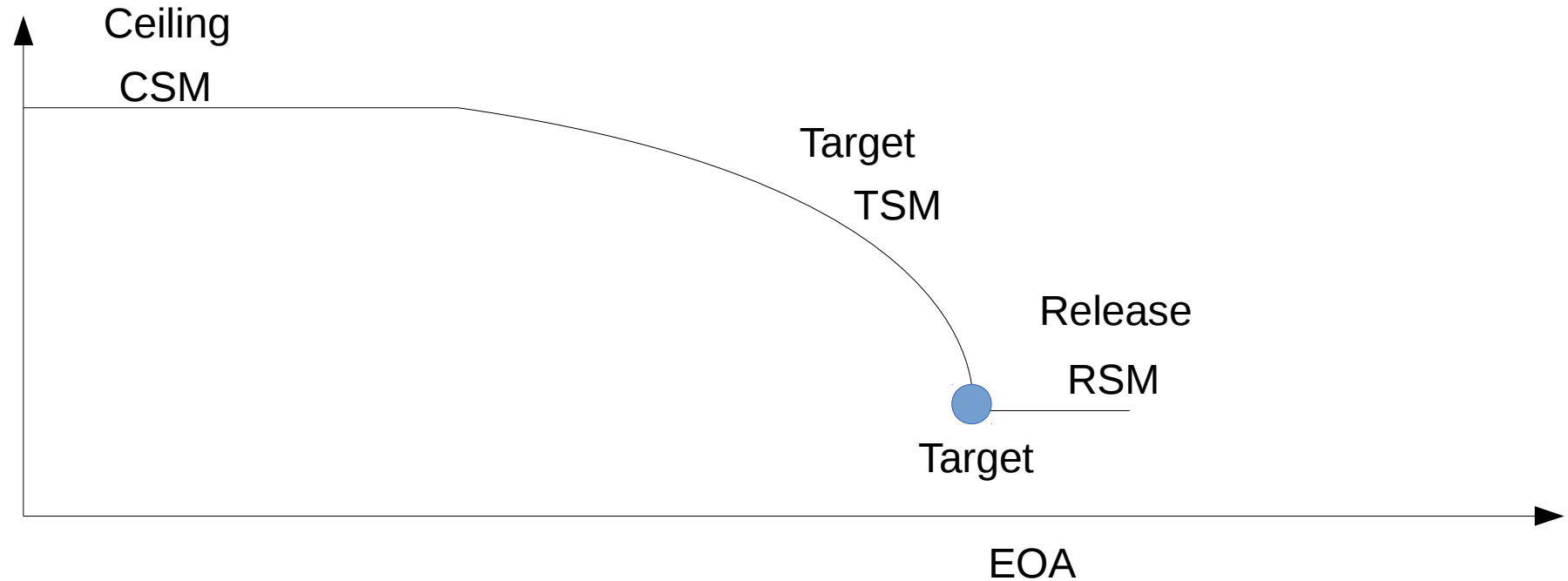**Thursday, Dec 11** Room S_3227

9h00 – 12h00: definition and sharing of homework

12h00 – 13h00: lunch time

Technical part
Braking curves principles
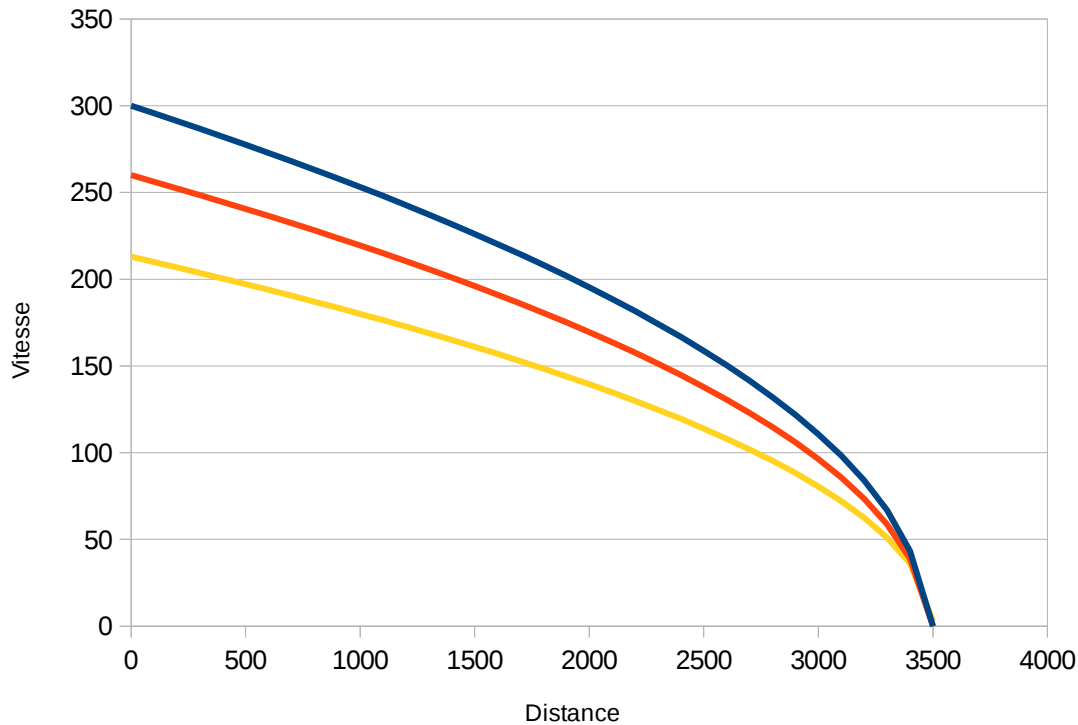
3 types of Speed Monitoring

CSM: Ceiling Speed Monitoring => speed constant limit
TSM: Target Speed Monitoring => speed reduction to a target limit (0 km/h or not)
RSM: Release Speed Monitoring => fixed and constant speed limit used to approach the EOA
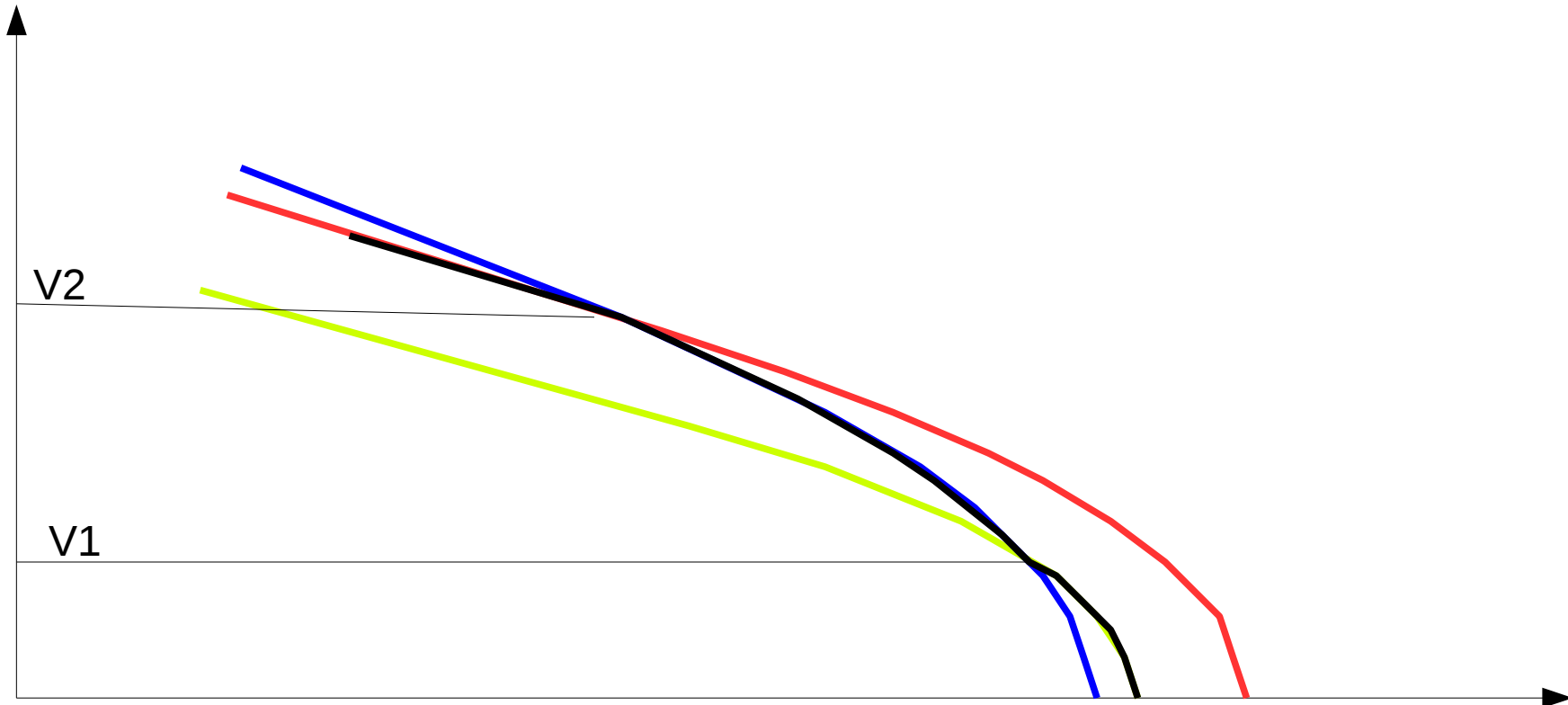
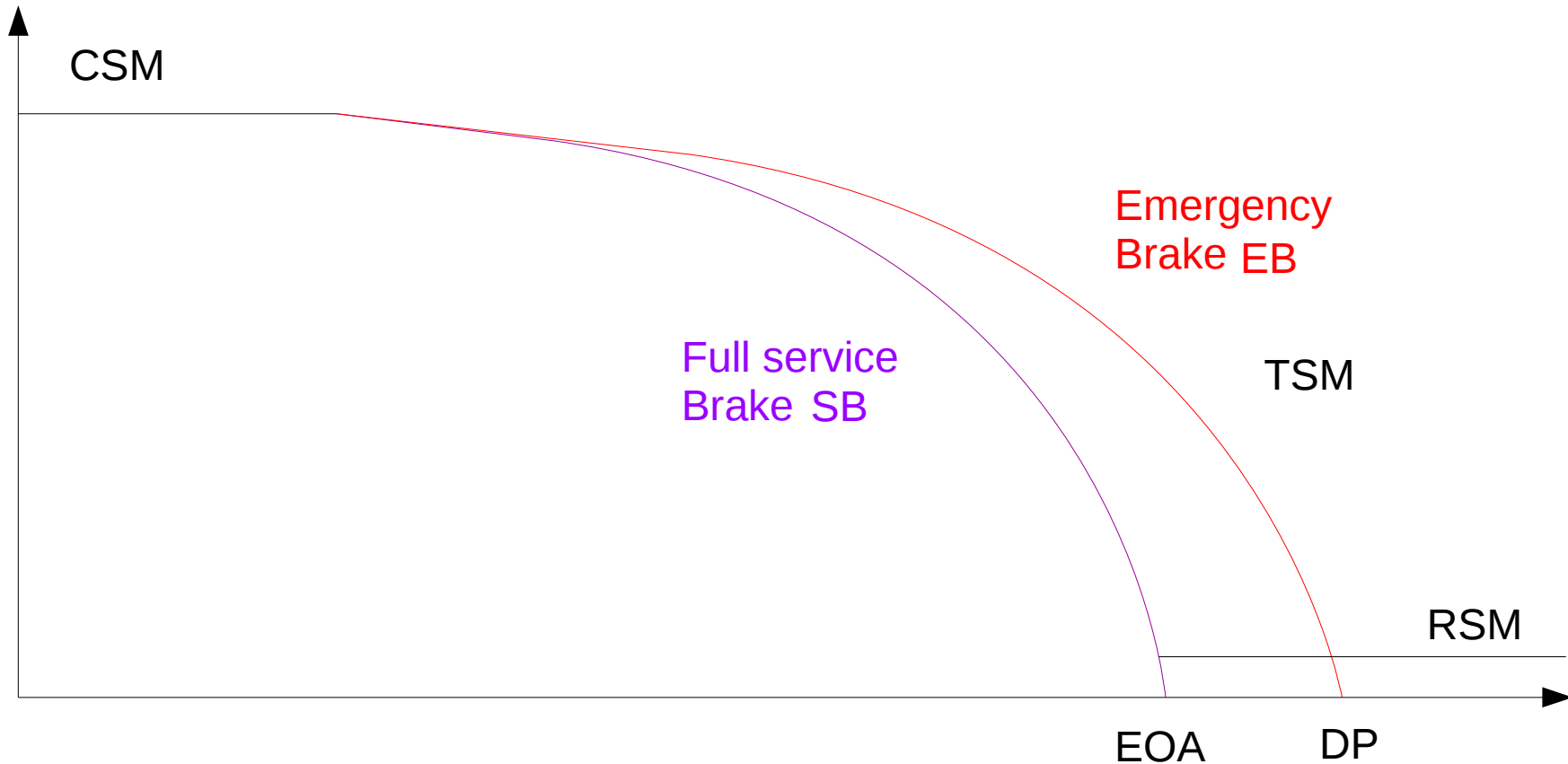# Braking curve equation

$$V_x^2 - V_o^2 = 2 \cdot A \cdot x$$
$$\Rightarrow \text{parabola}$$

Legend:
- —— -1,00m/s2
- —— -0,75m/s2
- —— -0,50m/s2

Braking curves deceleration

Deceleration is not constant. For ERTMS, it is defined step by step.
In this exemple (black curve), 3 deceleration values are used: red curve up to V2,
blue one from V1 to V2 and yellow curve under V1

Target: EOA - DP

CSM

Emergency
Brake EB

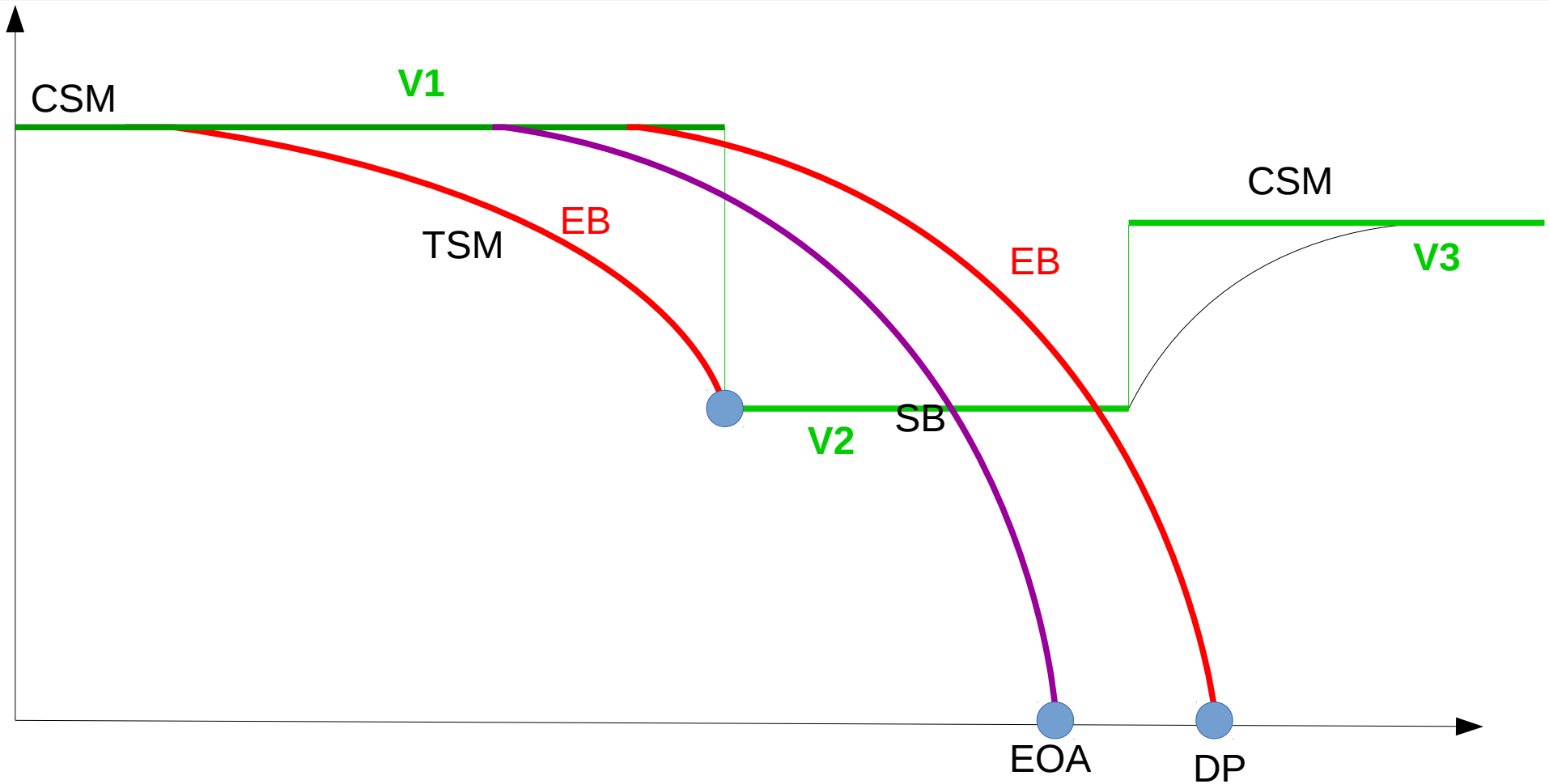Full service
Brake SB

TSM

RSM

EOA   DP

EOA is protected by the full (100%) service brake
Danger Point is protected by the emergency brake
There is one EOA/DP couple max in a MA
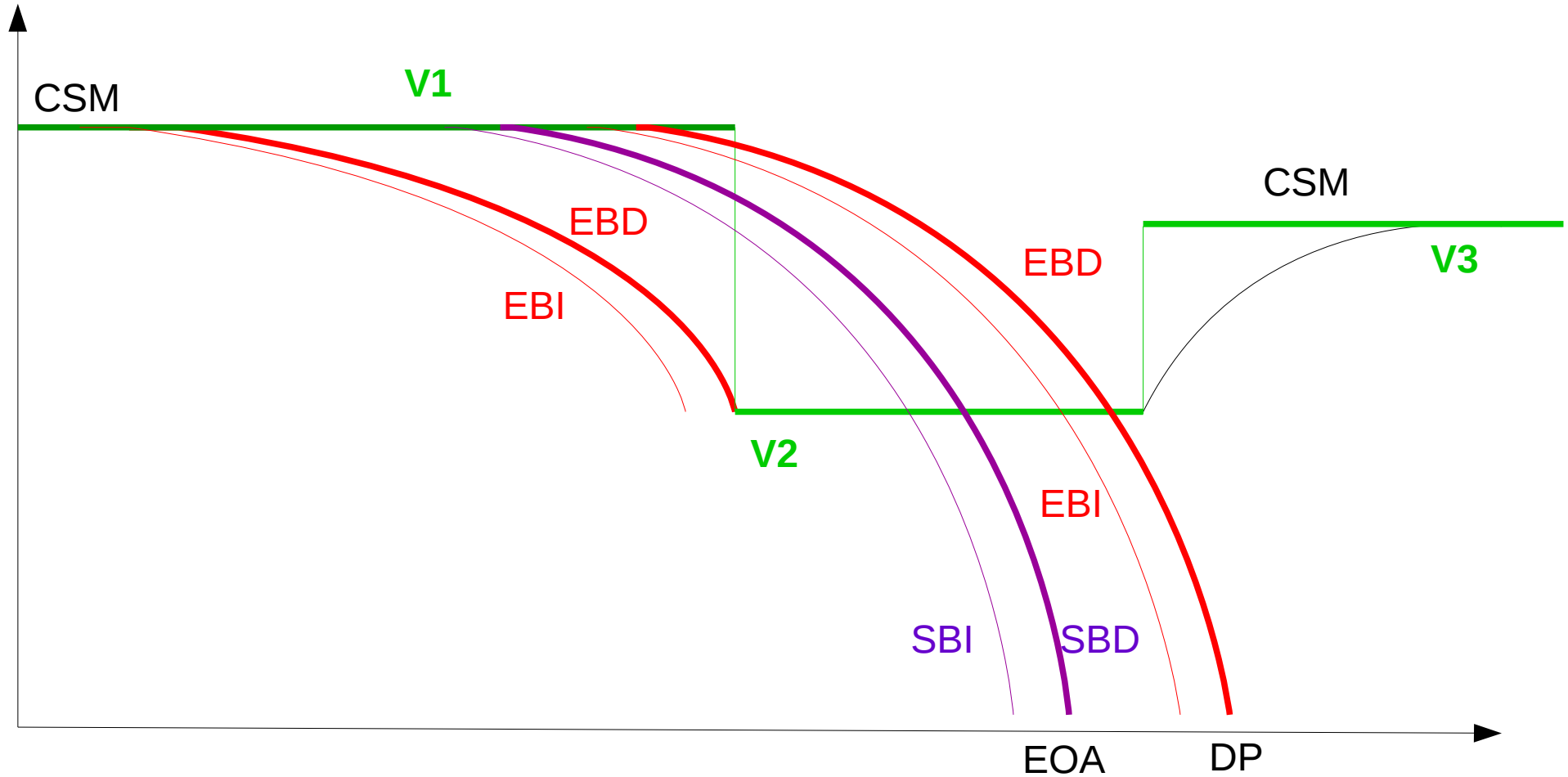
Target: MRSP
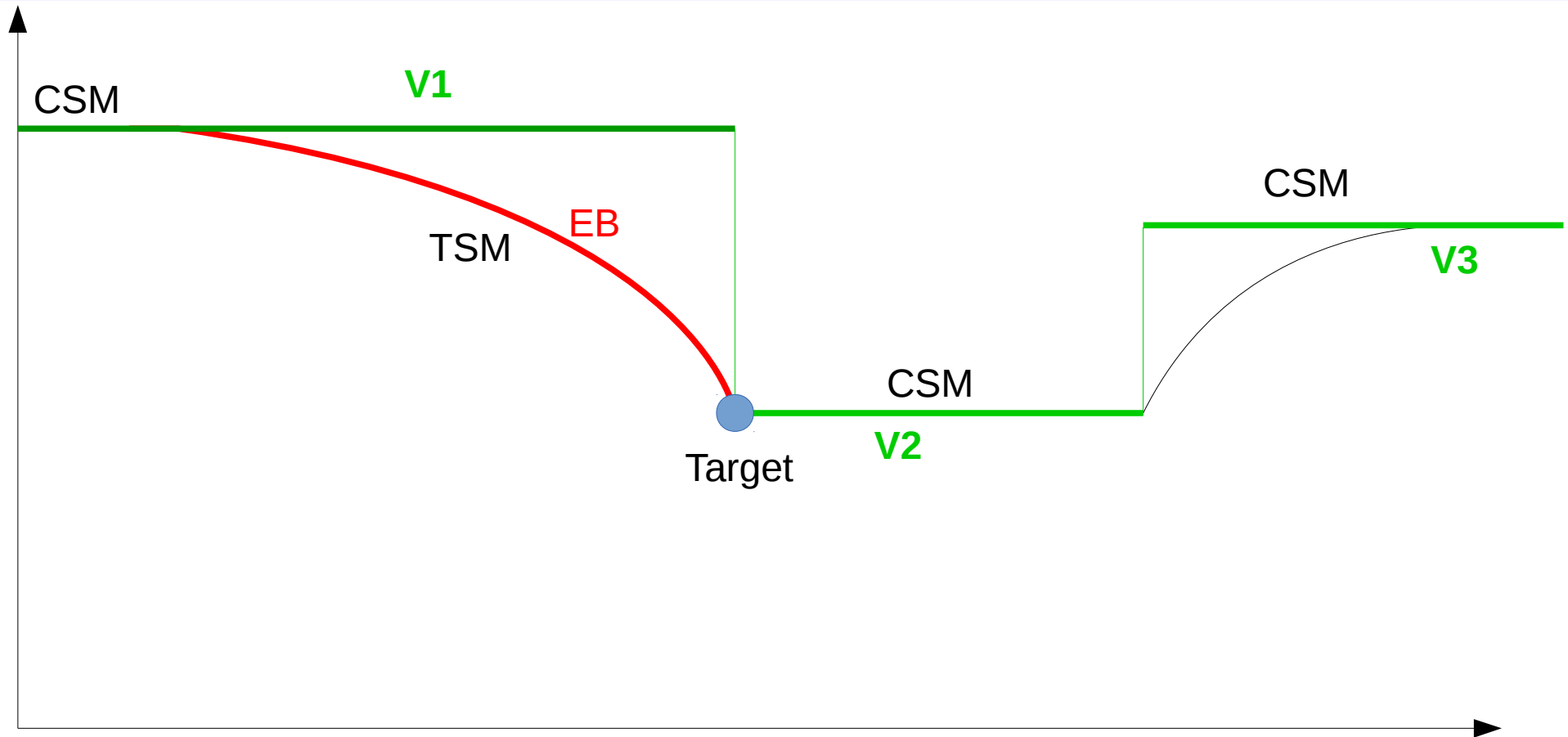
MRSP is the most restrictive speed between the speed limits (SSP, TSR, train max Speed,...). It is possible to have differents MRSP targets in a MA
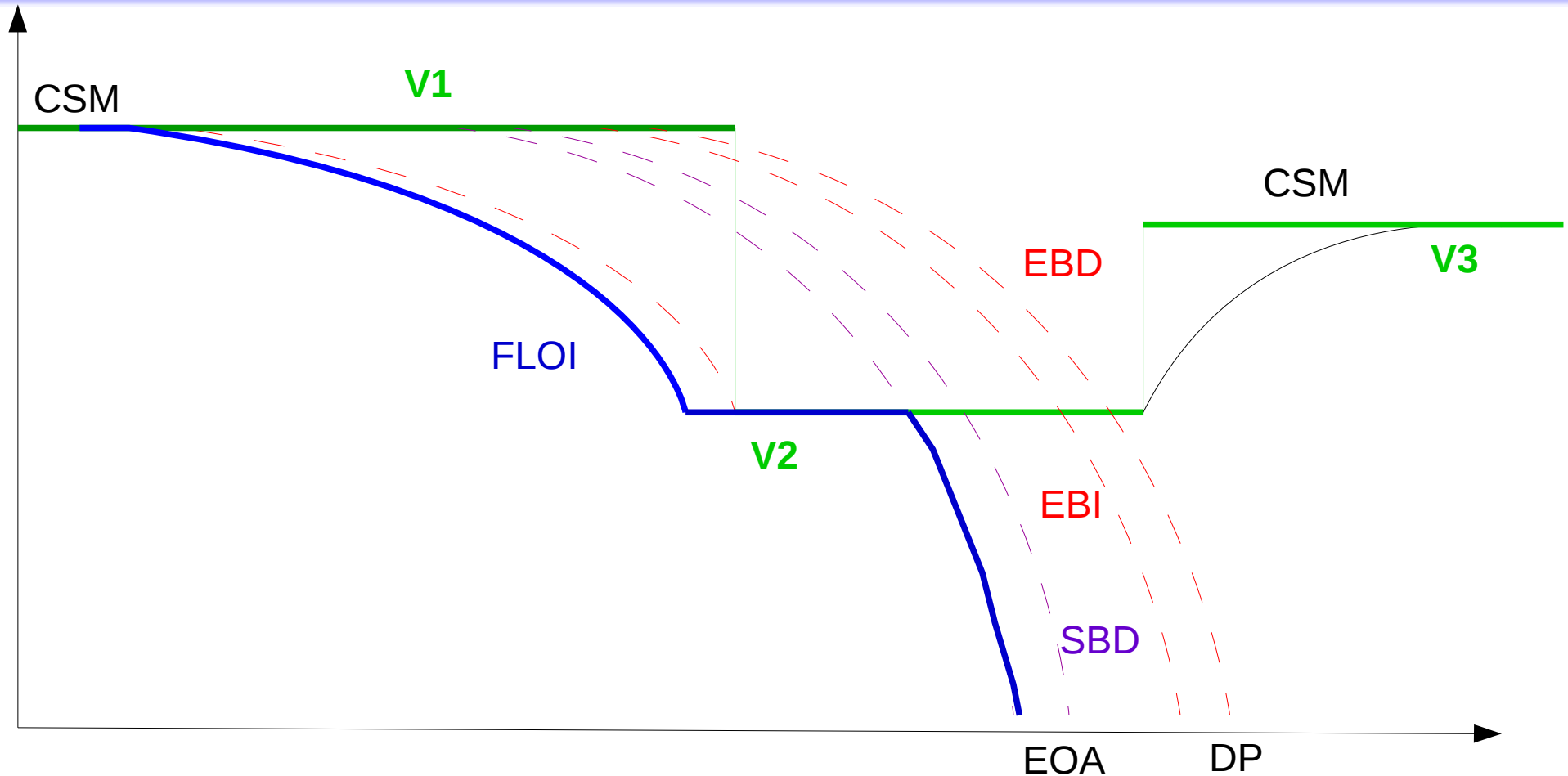
Each target has to be taken in account to find the braking limits

Target SM : EOA + DP + MRSP

There is a delay between the command and the full application of the brake
Therefore intervention curves has to be defined (EBI, SBI) in order to take in
account this delay

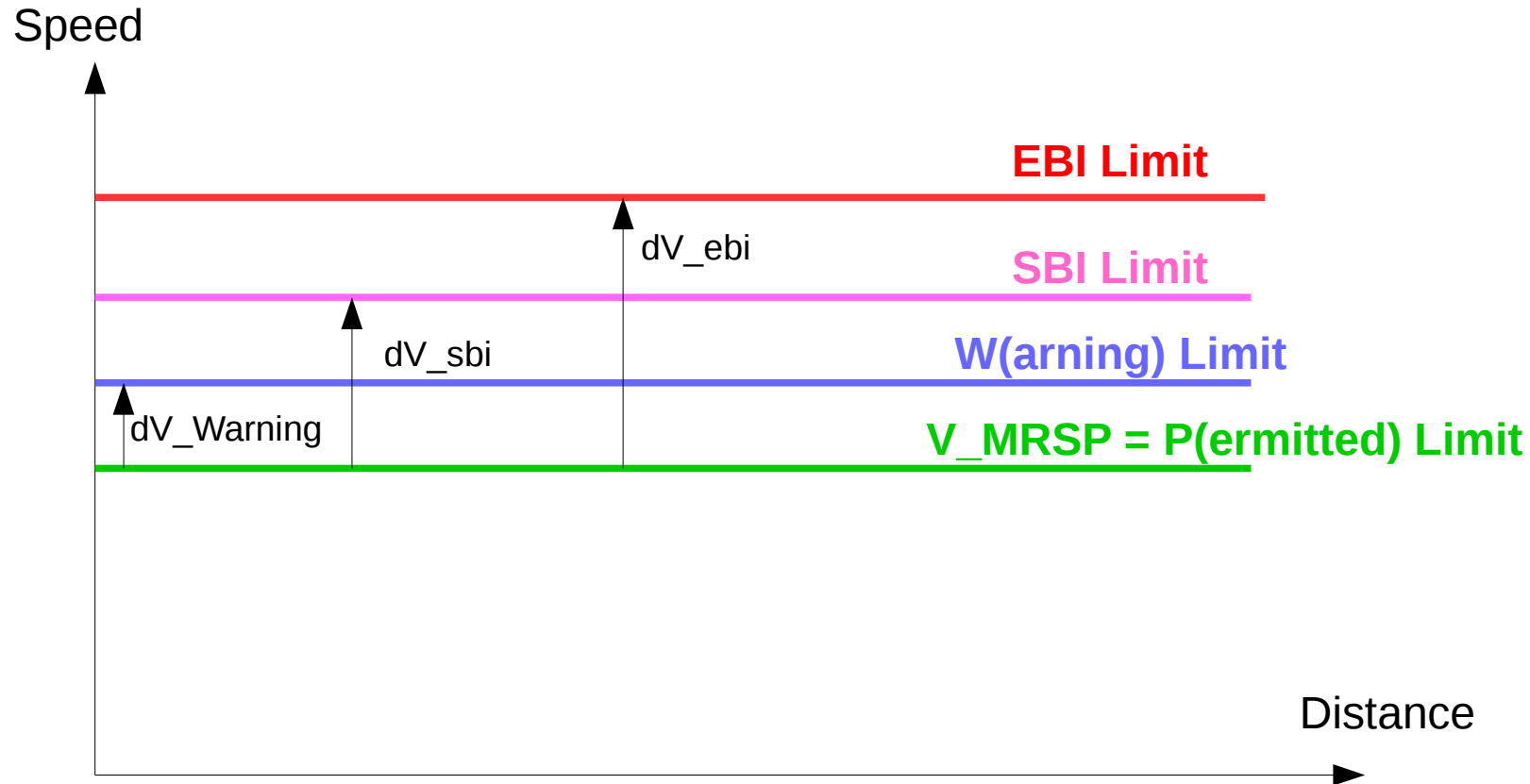The most restrictive limit defines the braking intervention : it is the FLOI (First Line Of Intervention)

FLOI is the reference to define W(arning) curve, P(ermitted) curve and I(ndication) curves

CSM Limits

WP3 - G1
Analysis and modeling steps

G1 analysis and modeling steps

Step 1 (end of january – beginning of february)

EBD / EBI curves in TSM, CSM and RSM

- only one danger point

- one given MRSP curve with 3 or 4 steps and at least 2 targets

- 3 A_safe constant values (0-50 / 50-100 / > 100 km/h)

- V_release = constant

- Build up times = constants

- no GUI, no SBD

- commands: Emergency Brake and TCO

- display: speed target, distance target, supervision mode (TSM, CSM, RSM), estimated speed

G1 analysis and modeling steps

Step 2 (march → first demonstrator)

SBD / SBI1 − SBI2 − FLOI − W − P − I curves

- Add EOA with SBD curve

- command: Service Brake

- matching DMI

G1 analysis and modeling steps

Step 3 (june)

Deceleration and build-up times calculation

- gradient

- slippery rail

- matching DMI

Step 4 (if needed)

Options

Calculate V_release

Calculate GUI

LOA, SR limit, specific MRSP

Meeting report

Before the workshop:
1. Scade model of Speed monitoring changes
2. Scade model of Internal CSM changes
3. Analysis of ch13 with eFFBD model and traceability
4. Description of the functionalities

During the workshop
1. Definition of the technical perimeter of the internal model
2. Definition of our internal steps and milestones
3. Definition of the perimeter of each internal step
4. Definition of the inputs needed for each step

1. If there is an EB command, an SB command is automatically sent to the train
2. A command is applied at each cycle since its revocation
3. The model does not check if the driver revokes the Emergency Brake as the train is not at standstill: it is the work of the TIU simulation

Is the emergency brake command sent by the mode module in case of train trip ?

The database shall contain located track events, sorted according to location

Events are for example :
- location of EOA
- location DP
- Change of SSP (location and speed)
- Beginning / end of slippery rail section
- Beginning / end of TSR
- ...

If possible, the location of each event shall be the absolute location, i.e. refered to the initialisation position of the train.

For each event, the database shall indicate :
- location
- type of event
- train running direction (normal / reverse)
- data: speed or other

Location of the target
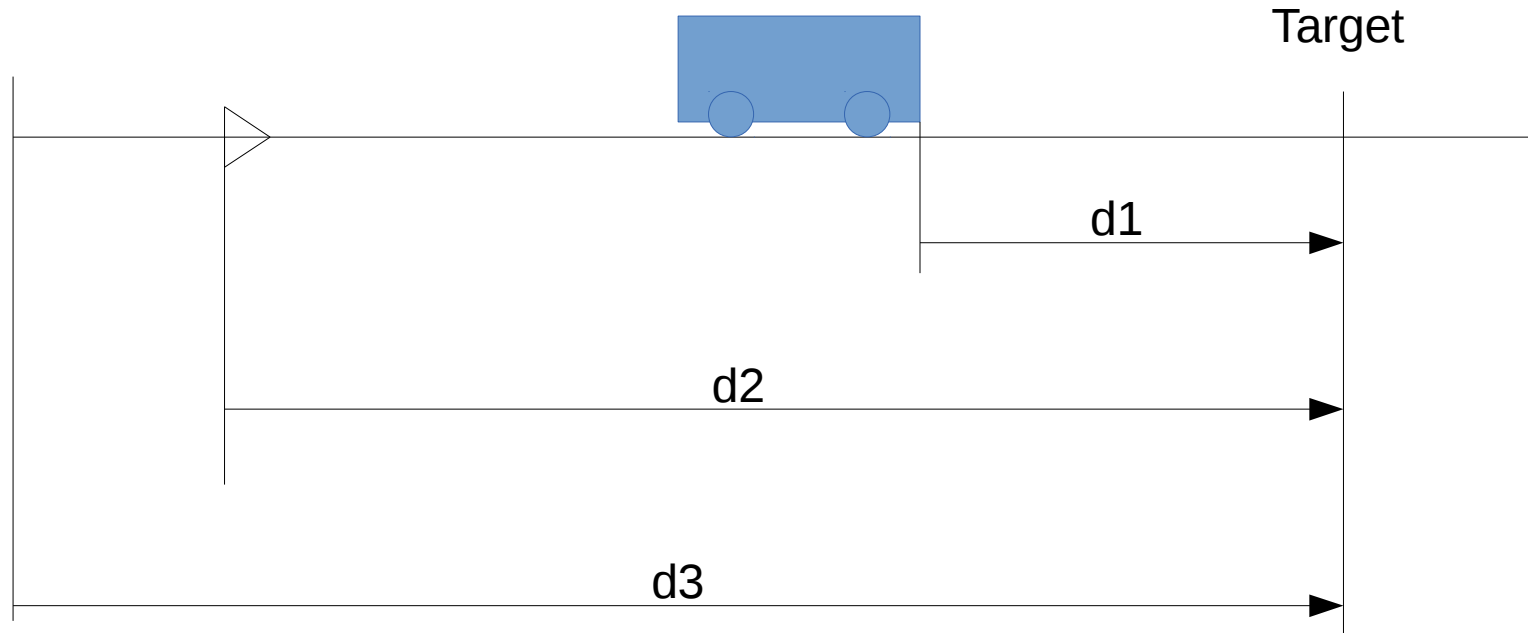
Location box will send d3 if possible

Database information needed for step 1 and 2 are :
- EOA (location)
- DP (location)
- MRSP changes (location and speed)

Database information needed for step 3 are :
- gradient
- adhesion factor

Extract from Scade model (state charts) on the Github => Benjamin

OpenETCS_SCADE_V2.docx on the Github => Christian

W3-G1 working steps document on Github => Véronique
Html eFFBD model on the Github => Véronique
List of external input needed (extract of the eFFBD model) on Github => Veronique
ADD G1 first version on Github => Véronique