



REPUBLIC OF SLOVENIA
MINISTRY OF THE ECONOMY, LABOUR AND SPORT
METROLOGY INSTITUTE OF THE REPUBLIC OF SLOVENIA



**I FEEL
SLOVENIA**

OIML R 91:2025

Field testing of average speed
meters

9.9.2026



OIML R 91 – Average speed meters

OIML Webinar, 9.9.2026
Roman Flegar, M.Sc.

... we love tricky questions ...

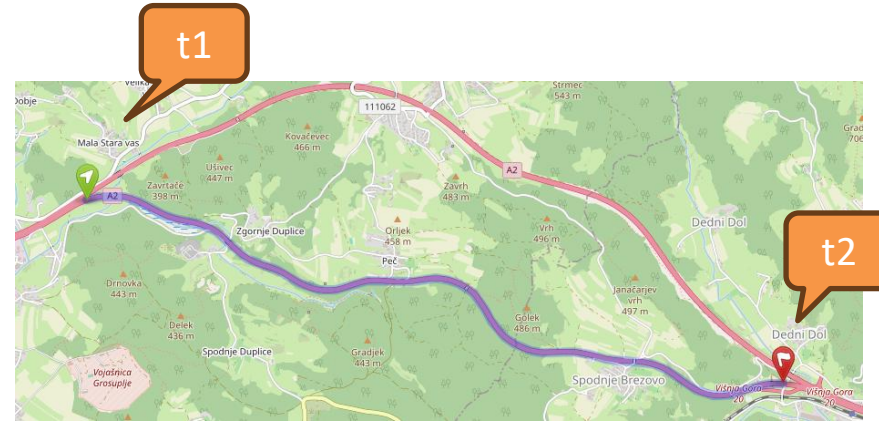
FIELD TESTING OF AVERAGE SPEED METERS

... 20 minutes ...

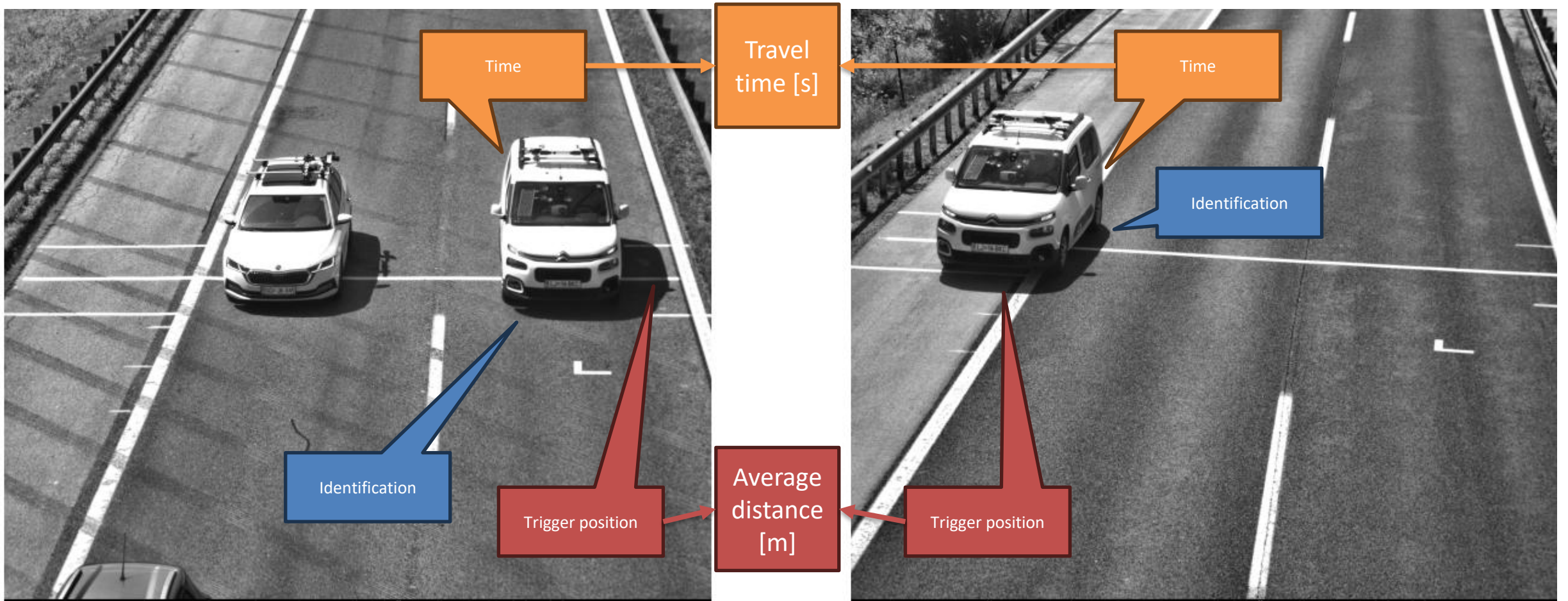
- General overview
- Only sharing the ideas
- Always opportunity to go into the details

Average speed meters

- Average speed is $v = \frac{D}{\Delta t}$
- Two main factors for MPE:
 - Actual travelled distance D [m] and
 - Actual travel time Δt [s] between $t1$ and $t2$ (synchronization)



What we need to prove



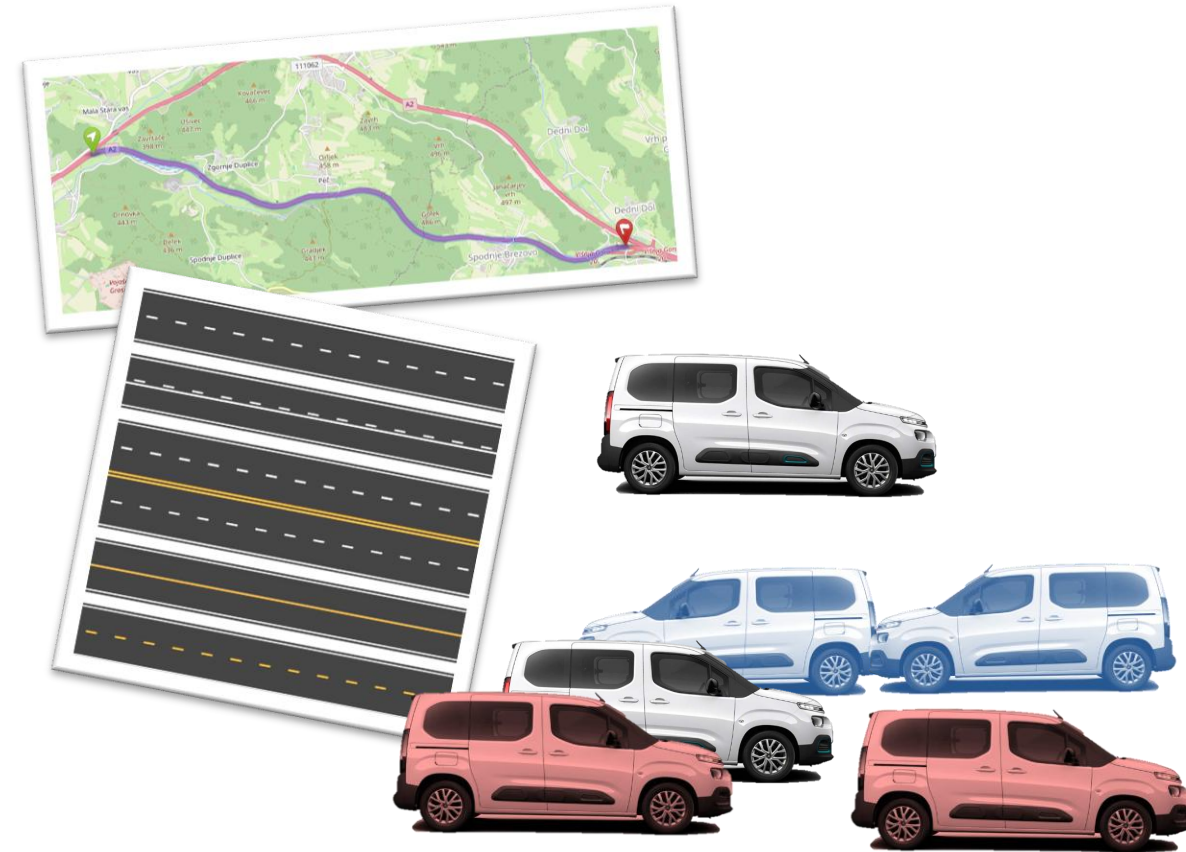
Why is field testing so important

- Close as is possible to real life conditions
- Simulations cannot cover everything ...
- MPE needs always another method to compare



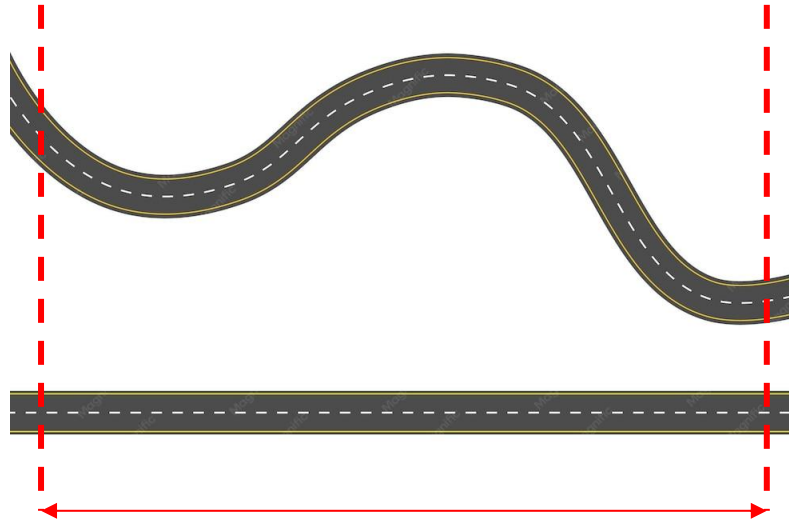
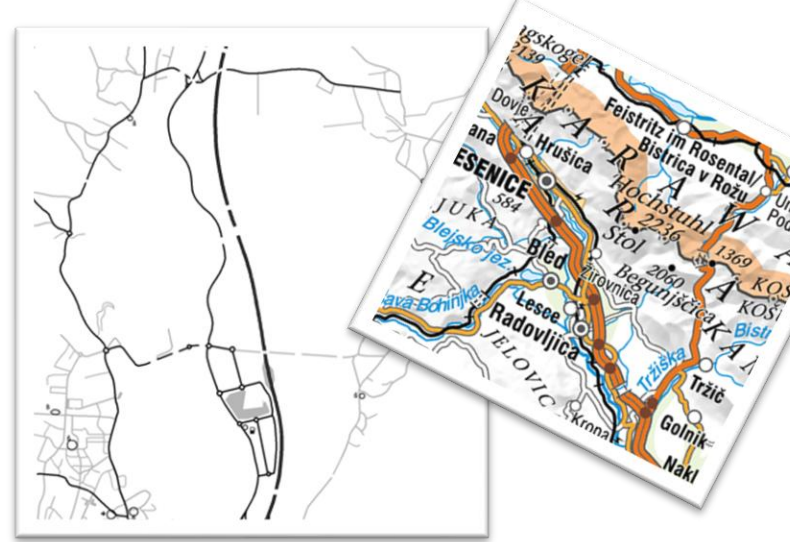
Why is tricky ...

- OIML R 91:2025 part 2 – Test procedures
- Point 4. metrological field test:
 - Selection of test sites [4.2]
 - Traffic conditions [4.3]
 - Number of measurements [4.4]
- Number of measurements: **500 measurements.**
- Less only with statistical analysis of errors ...



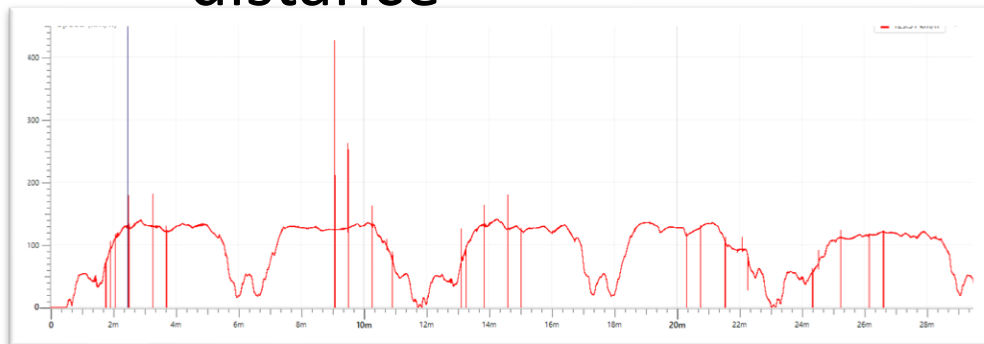
How to measure distance

- Dilemma:
 - Official cartography or
 - Field measurement
- How to account curves:
 - Shortest way
 - Averaging lines
 - “Ignorring”



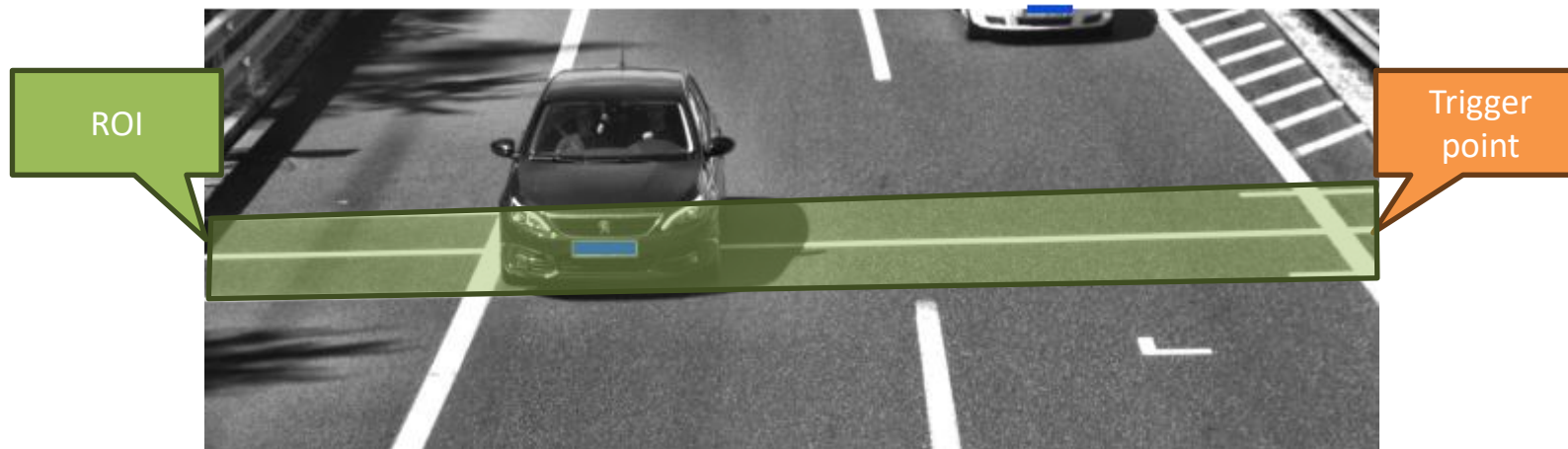
Equipment for distance

- Calibrated odometers
 - Vehicle signal
 - External measuring wheel
- Odometers based on scanners
- GNSS based odometers
- Magic of calculation of average distance



How to assure distance

- Mark the trigger point and ROI on the road
- Make graphical overlay for evidence photos
- Visual observation, AI tools are possibility



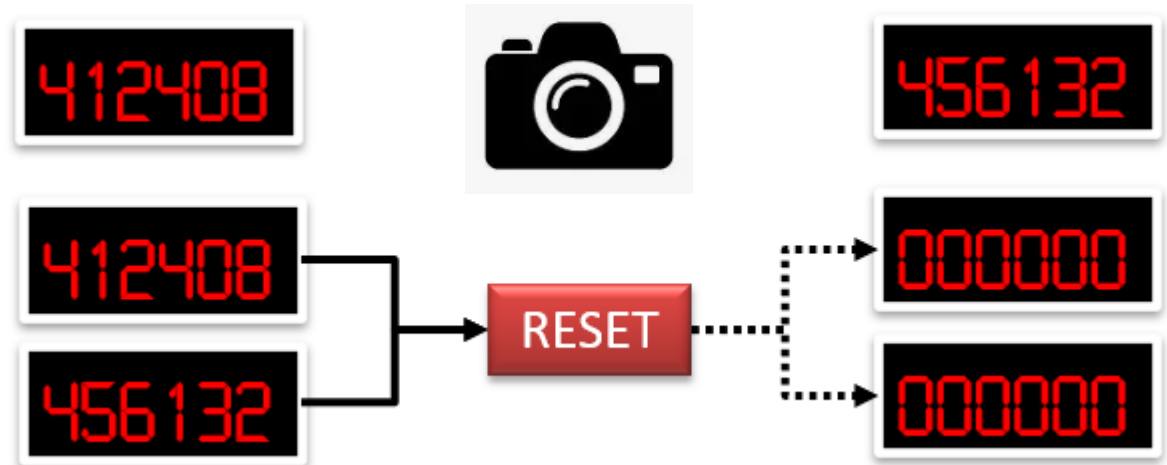
How to measure time

- Two approaches:
 - Vehicle with reference clock
 - Reference clocks at start and end point
- Advantages/disadvantages



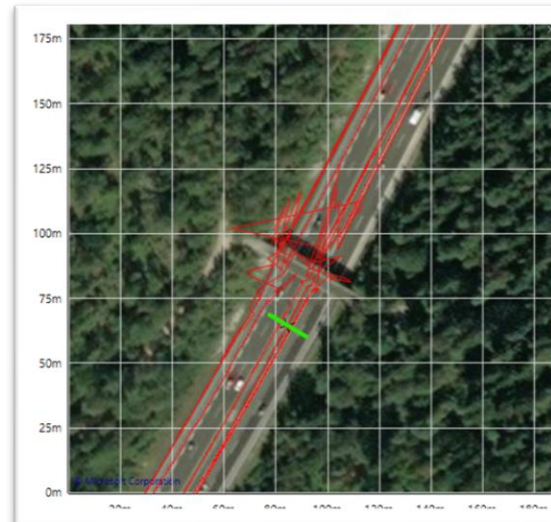
Reference clock at start and end point

- Two reference clocks
- Synchronisation:
 - Common RESET
 - Documented difference with photo
- Placing clocks at entry and exit point
- Make them visual on evidence photo



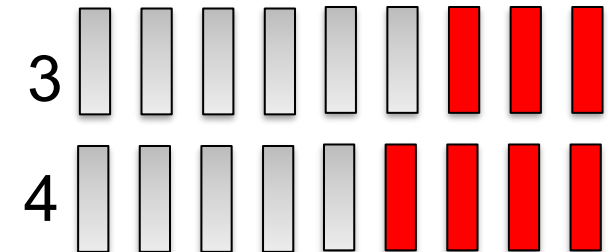
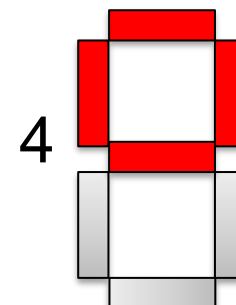
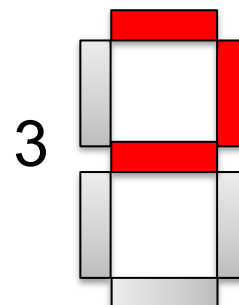
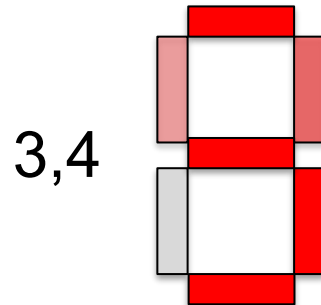
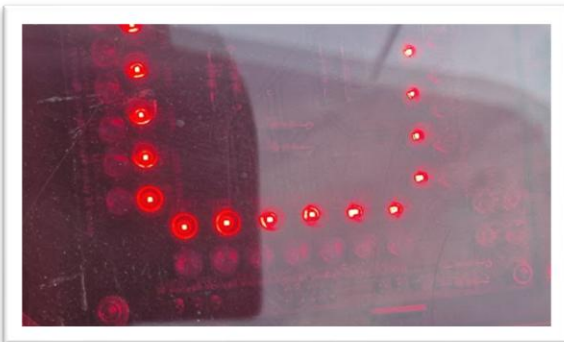
Vehicle with reference clock

- Possible approaches
 - External visual clocks
 - Internal clocks
 - GoPro
 - Time at GNSS transition: VBOX, Kistler Corevit-S
- Preferred for initial and subsequent verifications – related to one vehicle only



LED segments and refresh rate

- LED segments have problem:
 - Sunlight
 - Mounting/Installation
 - Refreshing
- Solutions:
 - Combined visual and IR segments
 - DOT/BAR interpretation of milli seconds



Reporting

- OIML R 91 – Part 3
- Decision
- List all results (referencing to other document)
- Describe method
- List reference instrument
- Traceability
- Photos
- Remarks

... more time to go into the details ...

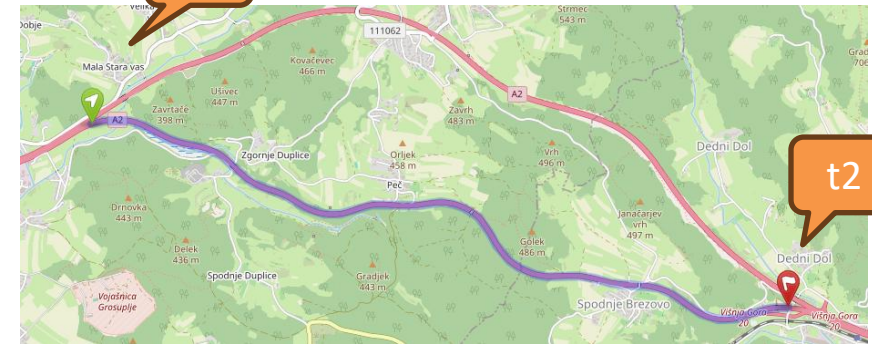
CONCLUSION

Conclusions

- Type approval
 - Distance measurement
 - Reference clock at entry and exit point
 - Visual evaluation of results
 - Reporting
- Initial and subsequent verification
 - Reference clock on the vehicle
 - Visual evaluation of results



t1



t2



THANK YOU ...