TRANSPORDIAMET

Interreg Central Baltic

EUROPEAN UNION
European Regional Development Fund

SMART E263/E77

Operation Principles of Dynamic Traffic Management on E263 road

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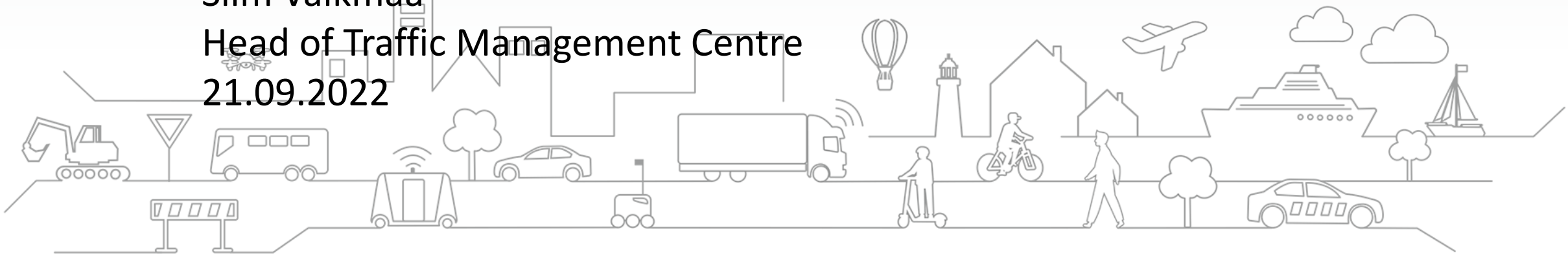


Estonian Transport Administration Traffic Management Center

- Responsible of management of 183 variable message signs on Estonian state roads, traffic information services and abnormal transport permits
- 6 persons
- Working hours from 7 AM to 8 PM (working days), 8 PM to 8 PM (weekends and national holidays)

Main categories of Variable Message Sign (VMS) content

Content displayed on VMS (both speed signs and information boards) falls into 5 categories:

1. Weather data from road weather stations - most important and most complex input for both speed management and warnings - used automatically, semi-automatically and manually
2. Accident warnings, with sometimes detour advice - automatic and manual actions
3. Other danger warnings (may include both speed signs and information boards): hazards and obstacles, traffic jams, roadworks - only manual actions
4. Traffic flow information from traffic counters, lower speed limits during rush hours (semi-automatic, currently in testing)
5. General warning messages: lowest priority, used usually seasonally, during special events etc.

3 main types of Variable Message Signs control

1. Fully automatic: Omnia reads in data, processes data according to configured algorithms, and automatically displays content on VMS
   - Speed control and warnings during nighttime (20-06).
   - Basic accident warning messages
   - Air and road temperatures (when road temp within -10…+5°)

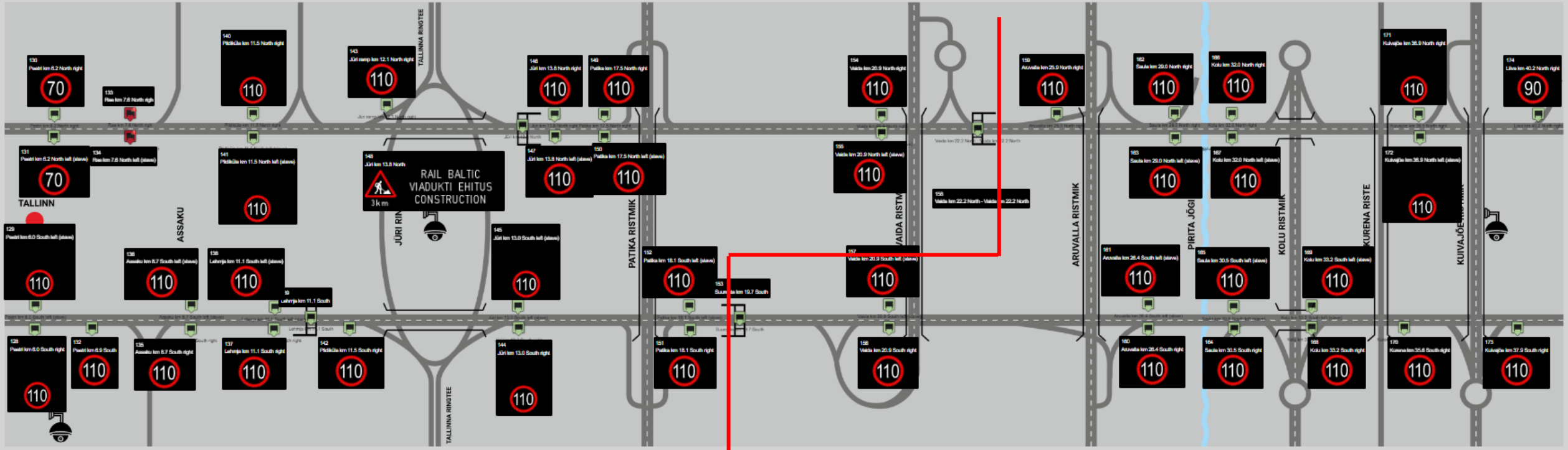
2. Semi-automatic: Omnia reads in data, processes data according to configured algorithms, and proposes content to operator for confirmation
   - Speed control and warnings during daytime (06-20).
   - Speed control according to traffic density from traffic counters (currently in test phase).

3. Manual: Operators gather information from external systems, and insert the content manually into VMS
   - More specific accident messages
   - Other danger warning messages
   - Traffic jams, travel time information
   - General warning messages

DIRECTION IS TOWARDS MORE AUTOMATION

Weather dependent VMS control

- SMART E263 project section: 34 km of 2+2 highway with variable speed management, fully operational from 19th of September
- Divided into 2 weather sections



Jüri weather section

Aruvalla weather section

Weather-dependent VMS Control (2): data layer

- Data from road weather stations with 5 min resolution
- 27 different „service levels“ which define the speed and warning messages that will be displayed on VMSs. Configured according to severity (from very bad to excellent)
- Allowed speed from 70 km/h (very poor) to 110 km/h (good)
- For some service levels, daytime/nighttime distinction is used
  - Nighttime speeds lower

Example of different service levels one day last winter from similar 2+2 road section

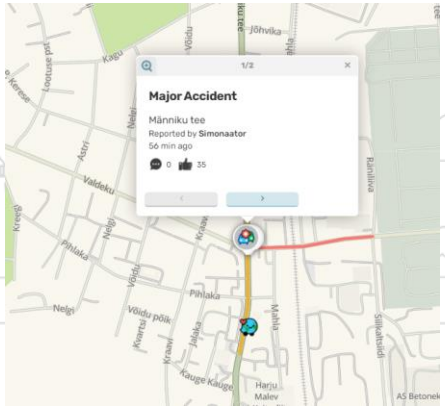
Output (29.01.22):

Time	StrategyName	Service level	Speed limit	Duration (h:mm)
00:00	Kukepala [auto]	Satisfactory B1 (icy road)	90	1:29
01:29	Kukepala [auto]	Good A0	100	5:20
06:49	Kukepala [auto]	Satisfactory B1 (icy road)	90	0:54
07:43	Kukepala [semi-auto]	Satisfactory B1 (icy road)	90	1:10
08:53	Kukepala [semi-auto]	Good A0	110	6:25
15:18	Kukepala [semi-auto]	Satisfactory B4 (snowfall)	90	1:10
16:28	Kukepala [semi-auto]	Satisfactory B1 (icy road)	90	1:38
18:06	Kukepala [semi-auto]	Satisfactory B2 (low grip)	90	0:23
18:29	Kukepala [auto]	Satisfactory B2 (low grip)	90	0:07
18:36	Kukepala [auto]	Poor C5 (heavy snowfall)	80	0:03
18:39	Kukepala [auto]	Satisfactory B2 (low grip)	90	1:06
19:45	Kukepala [auto]	Poor C5 (heavy snowfall)	80	0:09
19:55	Kukepala [auto]	Poor C8 (very low visibility)	80	0:24
20:19	Kukepala [auto]	Poor C5 (heavy snowfall)	80	2:37
22:56	Kukepala [auto]	Satisfactory B2 (low grip)	90	

Accident warnings

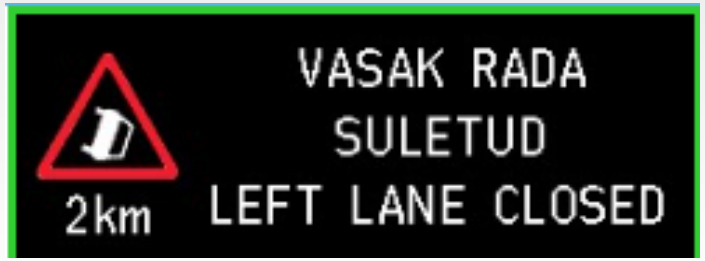
- Basic accident warning is automatic
  - Includes all info boards (but not VSL signs)
  - Data from National Emergency Center (112) via public Datex II service

- All additional actions manual
- Operators receive automatic notifications to email (only for accidents)
- Operators then check PTZ cameras, Waze, Google Maps, state, road info helpline 1247 messages etc

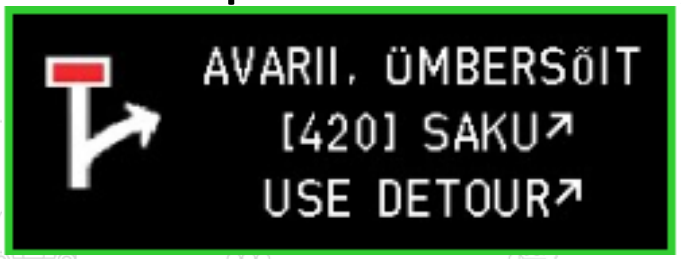


Accidents: manual actions

- Lowering of speed at variable speed limit sections
- More specific info from the action location



- Detour messages in case of road closures (prestored in the system for quick activation)

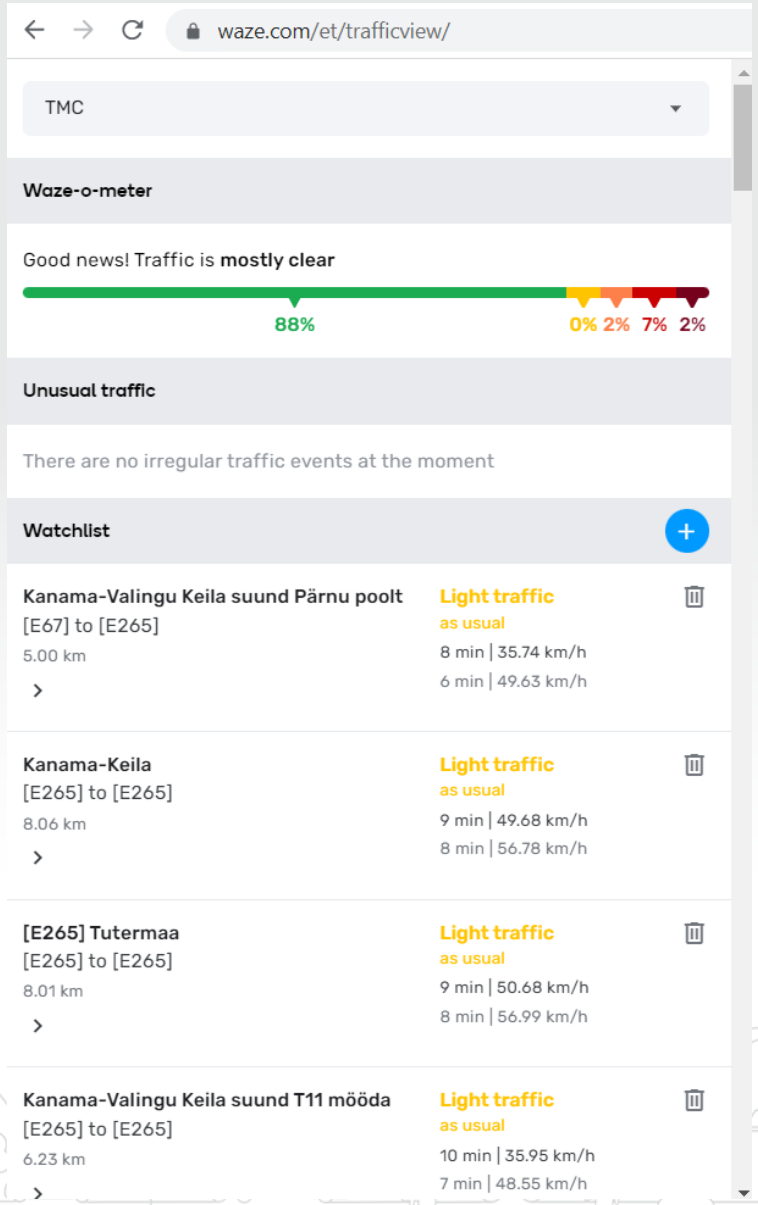


Other danger warnings: manual actions

- Other more common events:
  - Broken vehicles – speed reduced from 120 and warning displayed
  - Debris on road – speed reduced and warning displayed
  - Road maintenance works – speed reduced and warning displayed

Traffic jams

- Traffic jams and queues happen in the morning rush hour entering Tallinn and in case of accidents or road works
  - Traffic jam info from Waze Trafficview. Automated watchlist displayed on video wall, VMS control fully manual
  - When possible, we display the extra delay in minutes, with 5-minute accuracy and operator manually updating the VMS message each time the reported delay changes



General warning messages

They are generally the lowest priority manual messages:

- Wildlife warning at nighttime during wildlife high activity seasons

- Weather forecast warnings in previous day for serious snowfall at night/next morning

- Driver education of the working principles of ITS systems

- Road information phone

- Etc…

Automation development plans (1)

- Integrate Waze incident feed into Omnia
  - Quality and availability has proven good. Waze is widely used in Estonia.
  - We will recieve awareness of most hazards/incidents on VMS sections – currently besides accidents we don’t get the information in systematic way
  - Probably we will use both automatic and semi-automatic messages
  - Planned to go live by the the end of 2022


```
{
country: "EN",
city: "Jõgisoo",
reportRating: 0,
confidence: 1,
reliability: 8,
type: "WEATHERHAZARD",
uuid: "f1b70f03-1824-4855-a468-8055d541eec7",
roadType: 3,
magvar: 31,
subtype: "HAZARD_ON_ROAD_CAR_STOPPED",
street: "[E67]",
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x: 24.525522,
y: 59.277654
},
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},
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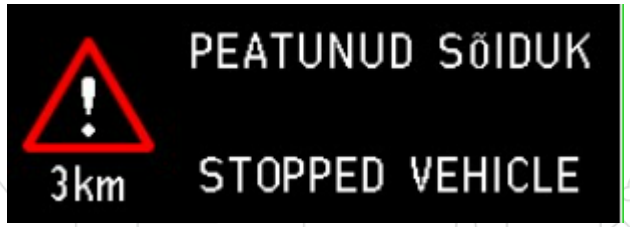

Automation development plans (2)

- Integrate travel time data into Omnia
  - Data from Waze or Tom Tom
  - Route monitoring in a systematic way
  - Serves as ab additional filter layer of information – ensures there are no events on „our“ highways that we might miss or find out too late
  - Possibility to (semi-)automatically display travel time information on VMS
    1. Regular routes, travel time to a known destination or for two alternative routes
    2. Display extra delay in case of accidents/incidents (currently fully manual messages)

Main goals and benefits

- Immediate warning of unexpected dangerous conditions before remedy measures are taken (e.g. slipperiness and unprotected accident area)
- Dynamic and location specific relevant traffic information for all road users (no discrimination ☺)
- Speed limit that is always adequate to the current conditions
- Safer, faster and smoother traffic

Thank You!

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