



Smolenice, Slovakia, May 29th - June 1st, 2018

MDSS in Slovenia – experiences after 2 years of operation



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Decision Support System



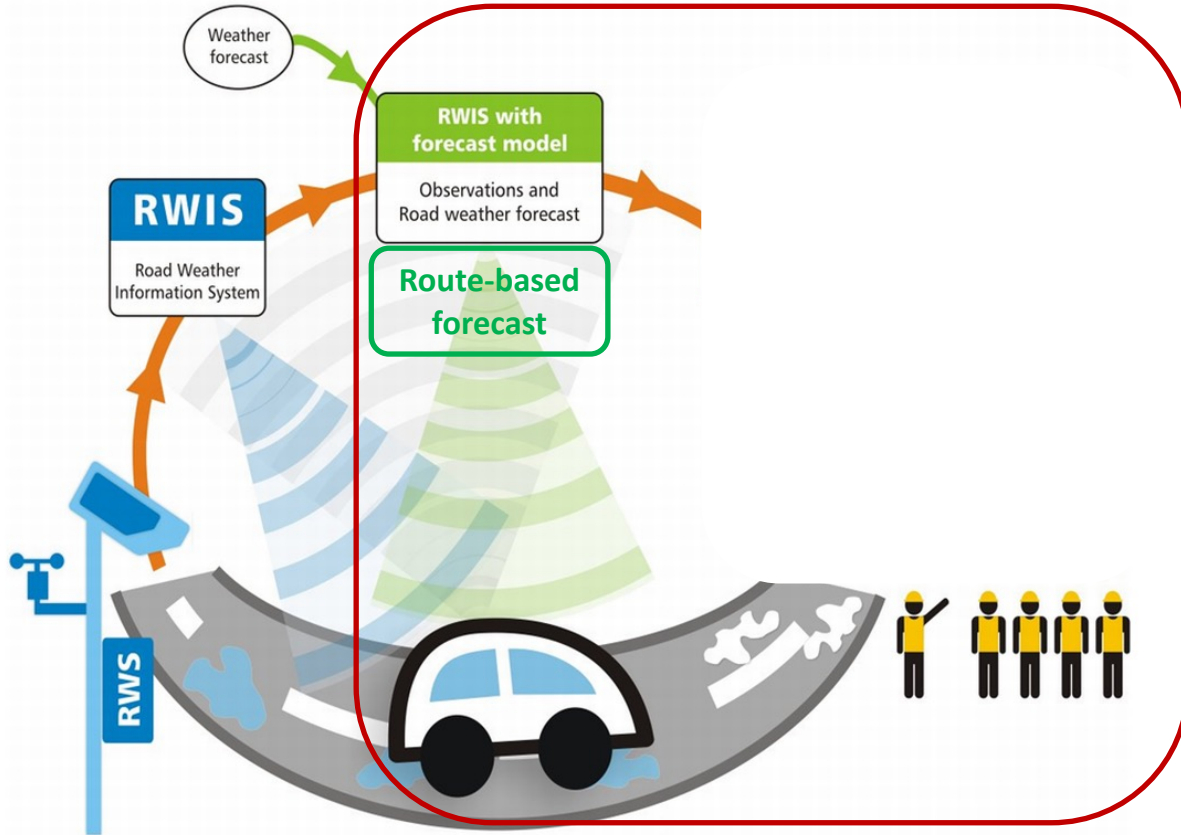
Source: MD-health.com

Agenda

- Challenges
- Microlocal route-based forecast
- MDSS – Maintenance Decision Support System
- Our experience
- Future work

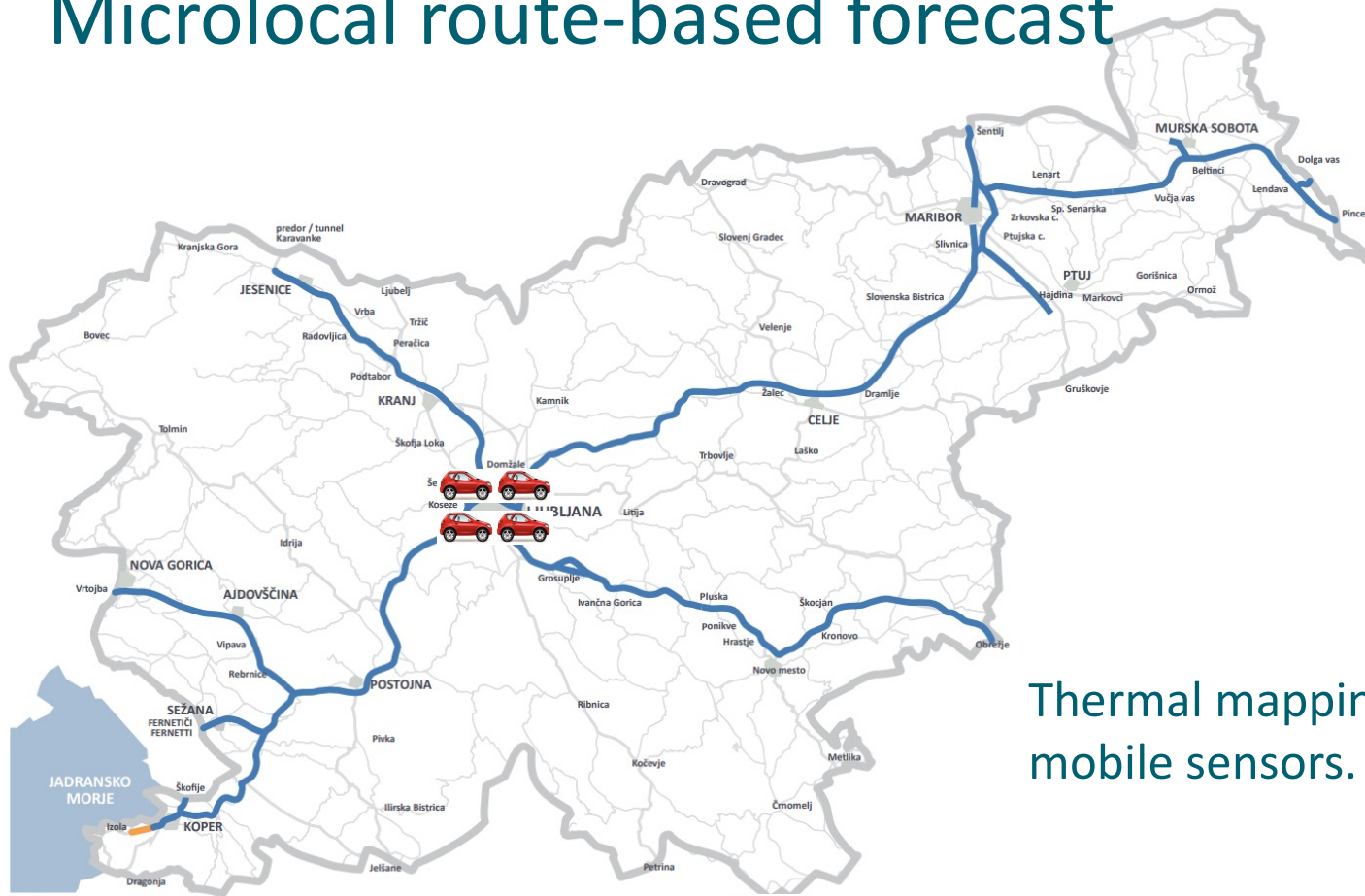
Challenges

- Greater **safety**, preventing accidents.
- **Preventing** infrastructure damage.
- Public services **optimisation**.
- Material **savings**.
- Environment **protection**.



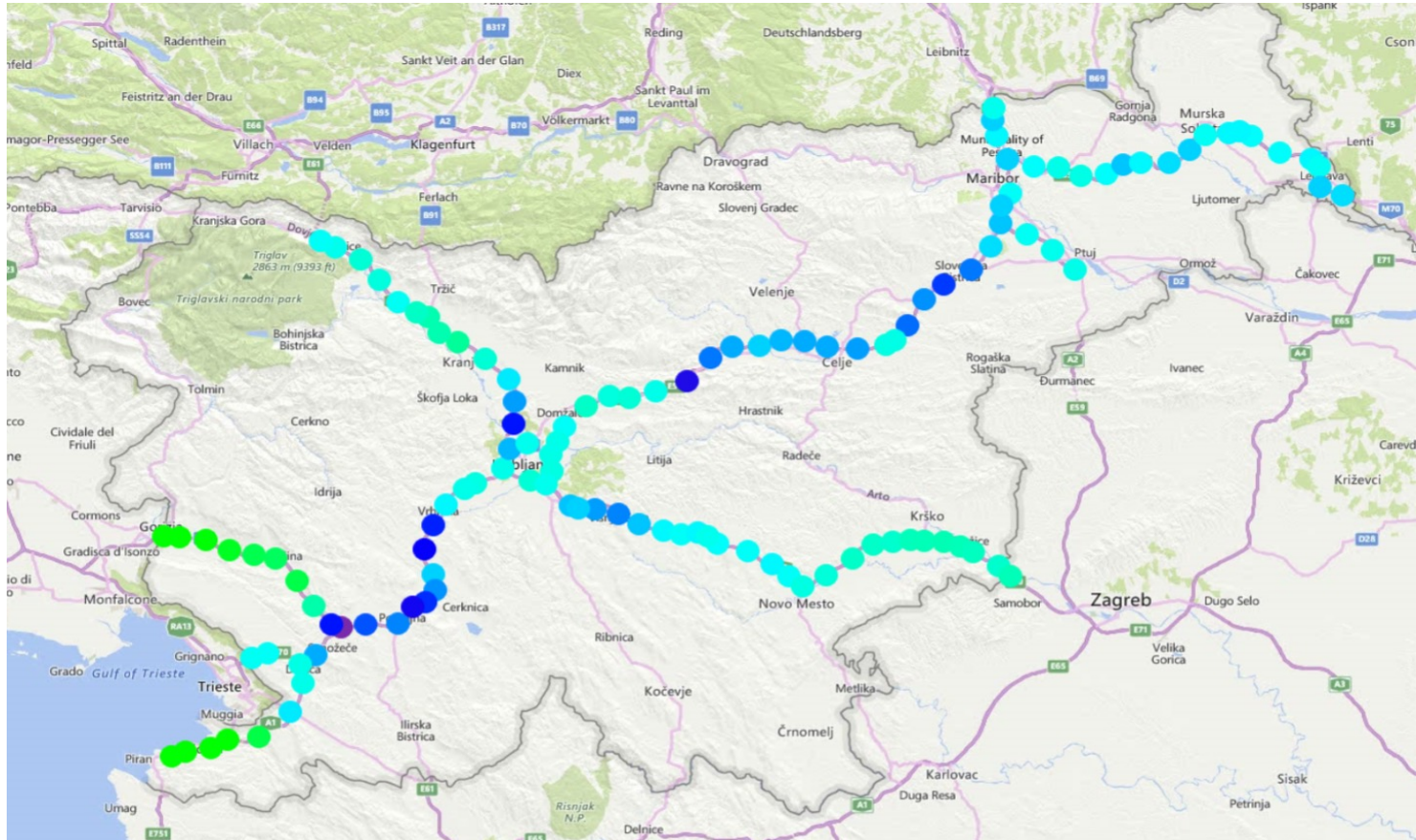
Development and implementation

Microlocal route-based forecast

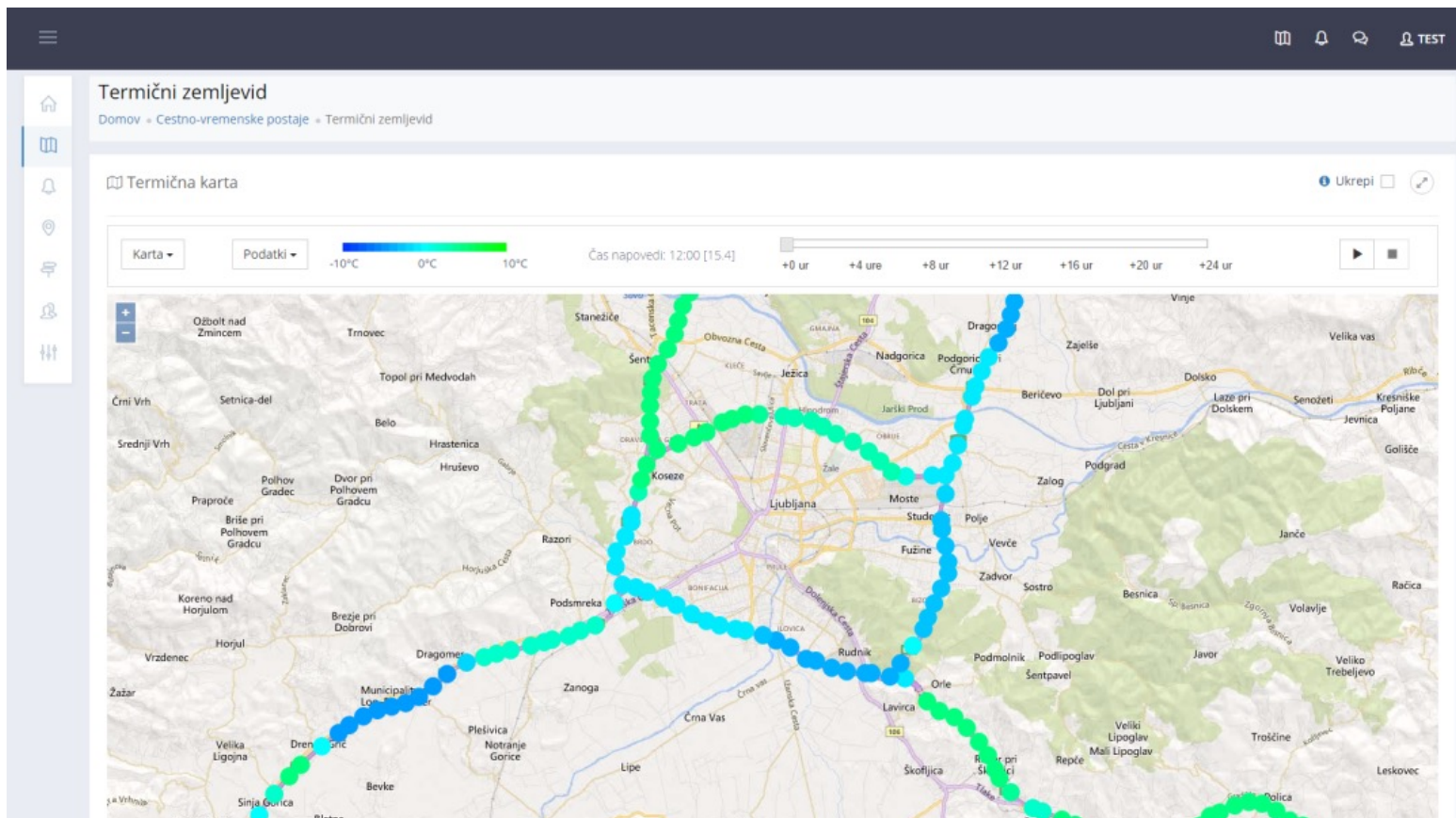


Thermal mappings with mobile sensors.

Microlocal route-based forecast

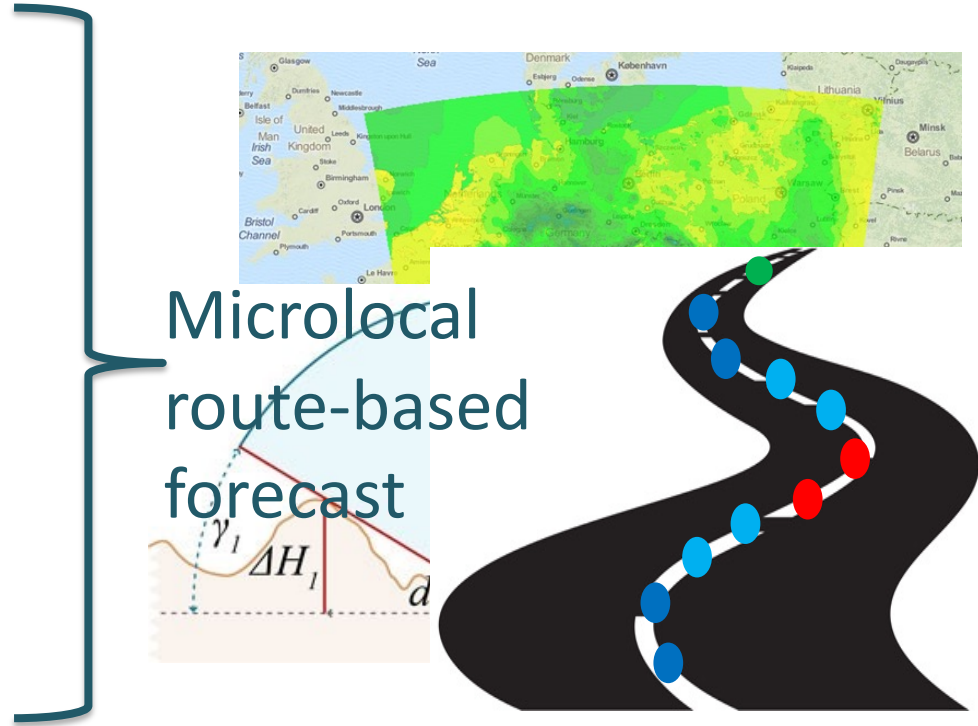


Microlocal route-based forecast



Microlocal route-based forecast

- METRo model (upgraded)
- High resolution weather forecast (INCA)
- RWIS and mobile sensors
- Additional optimisation



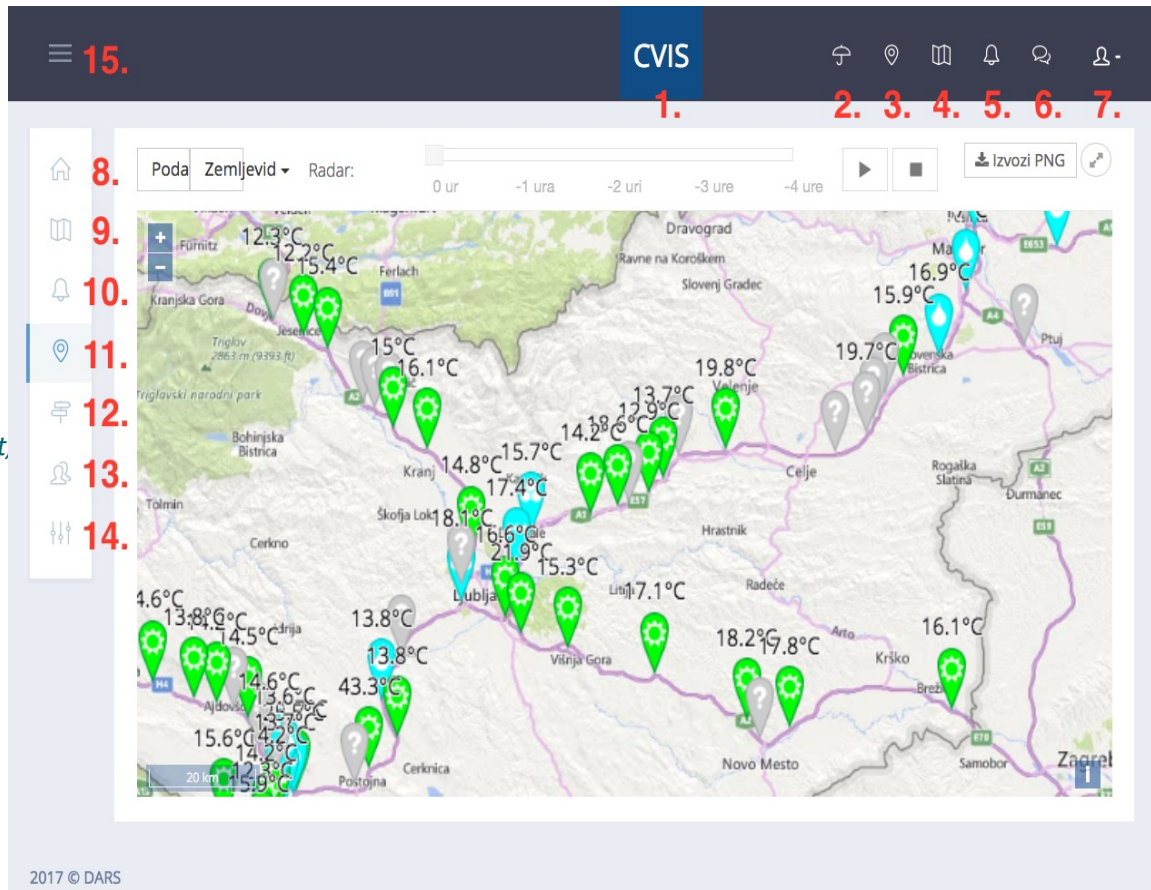
Verification of microlocal route-based forecast

- RWSs locations:
 - < 1°C in measuring range from -5°C to +5 °C
- Hand measurements
- Our internal verification
- Customer satisfaction

MDSS

MDSS user's interface:

- 1 connection to RWIS,
- 2 weather forecast in words and pictures.
- 3 map with RWSSs, reports about measurements,
- 4 road forecast with actions,
- 5 notices of measures,
- 6 message notices,
- 7 Edit your profile, browse conversations, and sign out,
- 8 The MDSS entry page,
- 9 road forecast with actions,
- 10 Overview of current and archive actions and the possibility of creating a new one,
- 11 map with RWSSs, reports about measurements
- 12 Overview of motorway bases,
- 13 User administration,
- 14 Control panel administration of applications and files,
- 15 Extension of the menu / navigation bar



MDSS

Izvozi PNG

Ukrepi Do 6 ur Do 12 ur

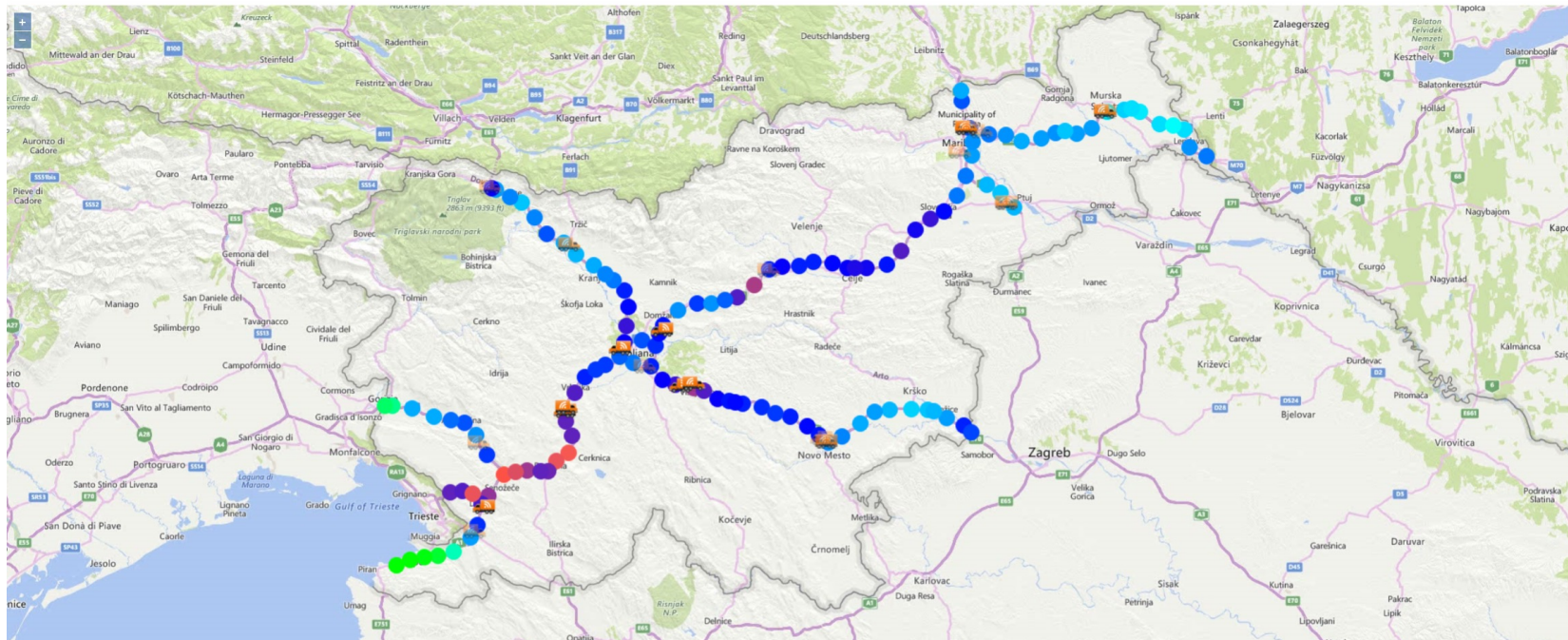
Podatki ▾

Zemljevid ▾



Čas napovedi: 23:00 [18.3]

trenutna +2 ur +4 ur +6 ur +8 ur +10 ur +12 ur



MDSS

☰

🔔 🏠 👤 TEST

📄 Cestno-vremenske postaje

Tip karte ▾ Prikaz podatkov ▾ Radar: 0 ur -1 ura -2 uri -3 ure -4 ure Animacija

9:03 [25.3.2014] **Kresnica**

Stanje cestnišča: ✔️

Vežer [km/h]: 👉 2.5

Stanje vremena: ✔️ (pogodno)

Cestnišče [°C]	Zrak [°C]	Rosilože [°C]	Zmrzišča [°C]	Vialnost [%]	Držnost	Višjivost [m]
15.8	7.5	-0.6	/	56	0	1968

Spletne kamere

1 2

Točkovna napoved (v urah)

25.3.2016	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00
Temp.	16.2	17.7	17.8	17.3	16.3	14.9	13.3	11.8	10.8	10.2	9.7
Stanje	✔️	✔️	✔️	✔️	✔️	✔️	✔️	✔️	✔️	✔️	✔️

MDSS

- **When** – Time window when the action should take the place.
- **Where** – Which section of the road needs salting | greeting | ploughing.
- **Action** – What precisely should be done. What chemical treatment with which mechanical help.
- **Effectiveness** – Analytics for improvements.

MDSS

Domov » Arhiv ukrepov

Arhiv - 351-400 od 16029 ukrepov

ACB | Status Aktivni V čakanju | Obdobje do

Stanje	Ukrepi	Posipni material	Silos/skladišče	Pot
v čakanju	• Pluženje	<i>posipni material ni izbran</i>	<i>silos/skladišče ni izbrano</i>	<ul style="list-style-type: none"> • razcep Nanos • Senožče • ACB Postojna • Logatec • Brezovica
v čakanju	• Pluženje • Moko posipanje	raztopina CaCl2 <ul style="list-style-type: none"> • količina ni vnešena • intenzivnost ni vnešena 	<i>silos/skladišče ni izbrano</i>	<ul style="list-style-type: none"> • Karavanke • Lesce

v čakanju	• Moko posipanje	raztopina CaCl2 <ul style="list-style-type: none"> • količina ni vnešena • intenzivnost ni vnešena 	<i>silos/skladišče ni izbrano</i>	<ul style="list-style-type: none"> • Črni kal • počivališče Ravne 	<input type="button" value="Poglej"/>	2.2.2018 15:00:00	2.2.2018 22:00:00	<input type="button" value="Poglej"/> <input type="button" value="Posodobi"/>
v čakanju	• Suho posipanje	NaCl - 4% vlažnost <ul style="list-style-type: none"> • količina ni vnešena • intenzivnost ni vnešena 	<i>silos/skladišče ni izbrano</i>	<ul style="list-style-type: none"> • MP Vrtojba • izpostava Vipava • razcep Nanos 	<input type="button" value="Poglej"/>	2.2.2018 15:00:00	2.2.2018 23:00:00	<input type="button" value="Poglej"/> <input type="button" value="Posodobi"/>
v čakanju	• brez posipanja	<i>posipni material ni izbran</i>	<i>silos/skladišče ni izbrano</i>	<ul style="list-style-type: none"> • MP Vrtojba • izpostava Vipava • razcep Nanos • Senožče • ACB Postojna • Logatec • Brezovica 	<input type="button" value="Poglej"/>	2.2.2018 15:00:00	3.2.2018 3:00:00	<input type="button" value="Poglej"/> <input type="button" value="Posodobi"/>
v čakanju	• Pluženje • Moko posipanje	raztopina CaCl2 <ul style="list-style-type: none"> • količina ni vnešena • intenzivnost ni vnešena 	<i>silos/skladišče ni izbrano</i>	<ul style="list-style-type: none"> • razcep Nanos • Senožče 	<input type="button" value="Poglej"/>	2.2.2018 15:00:00	2.2.2018 23:00:00	<input type="button" value="Poglej"/> <input type="button" value="Posodobi"/>
v čakanju	• Pluženje • Suho posipanje	NaCl - 4% vlažnost <ul style="list-style-type: none"> • količina ni vnešena • intenzivnost ni vnešena 	<i>silos/skladišče ni izbrano</i>	<ul style="list-style-type: none"> • Logatec • Brezovica 	<input type="button" value="Poglej"/>	2.2.2018 15:00:00	2.2.2018 23:00:00	<input type="button" value="Poglej"/> <input type="button" value="Posodobi"/>

Ukrep

Domov » Seznam ukrepov » Ukrep

Ukrep je arhiviran

Lastnosti

Posodobilo

STANJE UKREPA	v čakanju ●
POSIPNI MATERIAL	raztopina CaCl ₂
KOLIČINA POSIPNEGA MATERIALA	-
INTENZIVNOST POSIPANJA	25 g/m ²
SILOS/SKLADIŠČE	-
AC BAZA	AC baza Ljubljana
ZAČETEK UKREPA	1.3.2018 14:00:00
KONEC UKREPA	1.3.2018 21:00:00

Učinkovitost ukrepa

Učinkovitost

- 100: uspešen ukrep
- 70-99: visok učinek
- 51-69: zmeren učinek
- 31-50: nizek učinek
- 30 in manj: brez učinka
- Ni podatkov za izračun učinkovitosti

Jakost zimskega dogodka

- 0-20: blag dogodek
- 21-79: zmeren dogodek
- 80-100: izjemen dogodek
- Ni podatkov za izračun jakosti dogodka

Učinkovitost	Jakost zimskega dogodka	Najvišja hitrost vetra [km/h]	Najvišja debelina vodnega filtra [mm]	Najnižja temperatura ceste [°C]	CVP
Učinkovitost ukrepa se ni bilo mogoče izračunati. Izračuna se 2 do 4 ure po končanem ukrepu.					

Opis

Na tem območju bo pred ukrepom:

- najnižja temperatura °C.
- najslabše stanje cestišča bo poredica.
- na cesti bo največ 0 cm snega.

Po ukrepu bo na tem območju:

- največ 0.09 cm snega.

Tipi ukrepa

Mokro posipanje

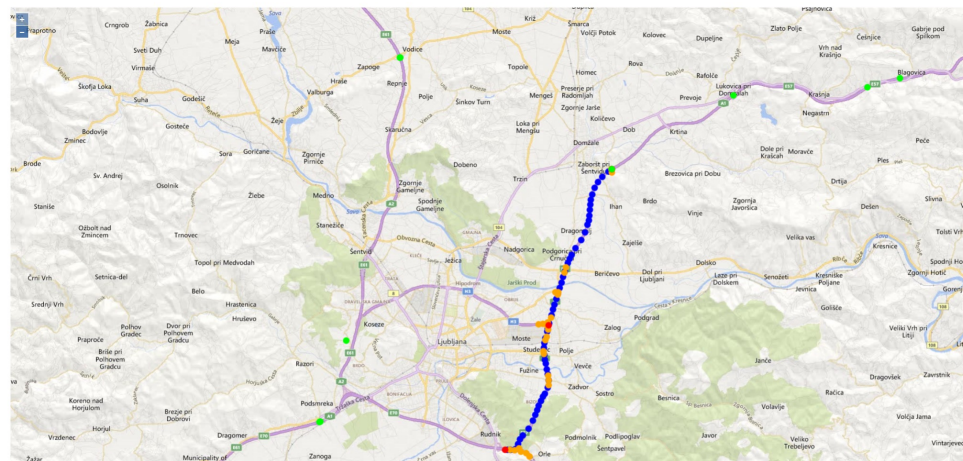
Pot

Domžale

razcep Zadobrova

razcep Malence

Izbrana pot

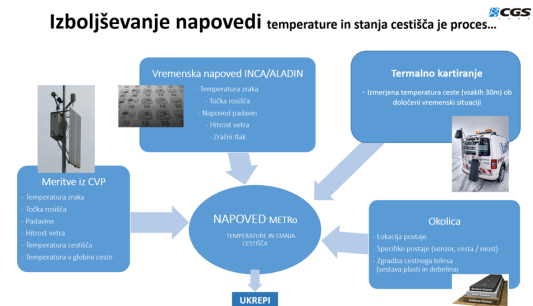


Our Experience – Micro local route based forecast

Route-based weather forecasts optimisation is a never-ending story.

We developed our own algorithms and methods to extrapolate measurements from RWSs and forecasts and we are still working on them.

Verifications of route-based forecasts were made with occasional additional measurements at some points.



Our Experience – Implementation

The implementation of the MDSS into the winter service and the education of users was also a very important task of our implementation.

Training was carried out across all road bases. Winter service staff is a demanding user who expect precise and reliable weather information on the road. Continuous cooperation with road winter maintenance staff is the key to an effective system that is tailored to the needs of the user.



Future work

- 15 new mobile sensors on winter service vehicles
 - route-based weather forecast verification
 - dynamic route-based weather forecasts, especially on critical sections
- Probabilistic forecast
- Salt model

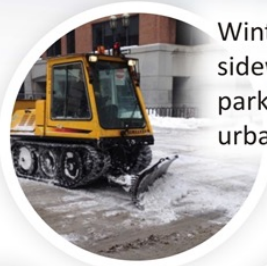


Conclusion

Road winter maintenance / snow and ice forecasting



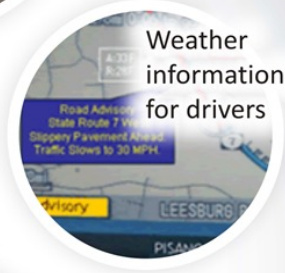
Winter maintenance of sidewalks, cycle tracks, parking lots and other urban areas



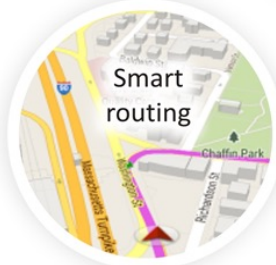
Public transport management



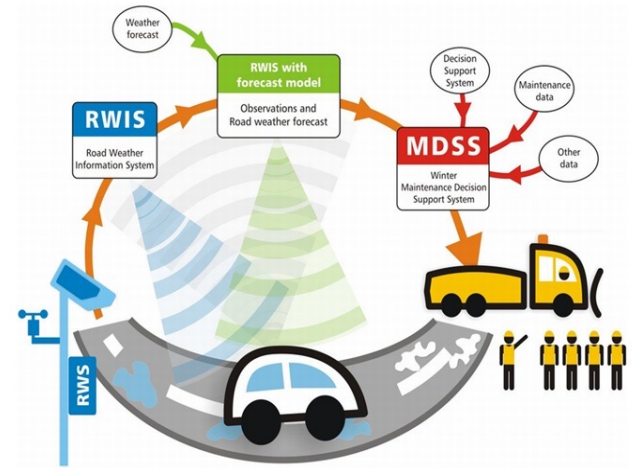
Weather information for drivers



Smart traffic signs



Smart routing



IoT and Cloud ready

Thank you!



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