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RADAR

# What RADAR means for Bulgaria and Bulgarian engineers

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**2nd International Road Safety & Innovation Forum**

*Leveraging new technologies and good practices from Europe and beyond*

**Co-hosted by BBARS, IRF in association with the 17th EuroRAP General Assembly**

BULGARIAN BRANCH ASSOCIATION ROAD SAFETY
IRF GLOBAL
EuroRAP EUROPEAN ROAD ASSESSMENT PROGRAMME



Project co-funded by European Union funds (ERDF, IPA, ENI)

# Danube area in numbers:

114 000 000

people

# Danube area in numbers:

20 000

average EUR GDP

# Danube area in numbers:

5

EU corridors

# Danube area in numbers:

1,164,643
km of roads*

*RADAR raw data incl. Hr,Hu,Si,Md,Bg,Srb,Sk,BiH,A

# 3,352

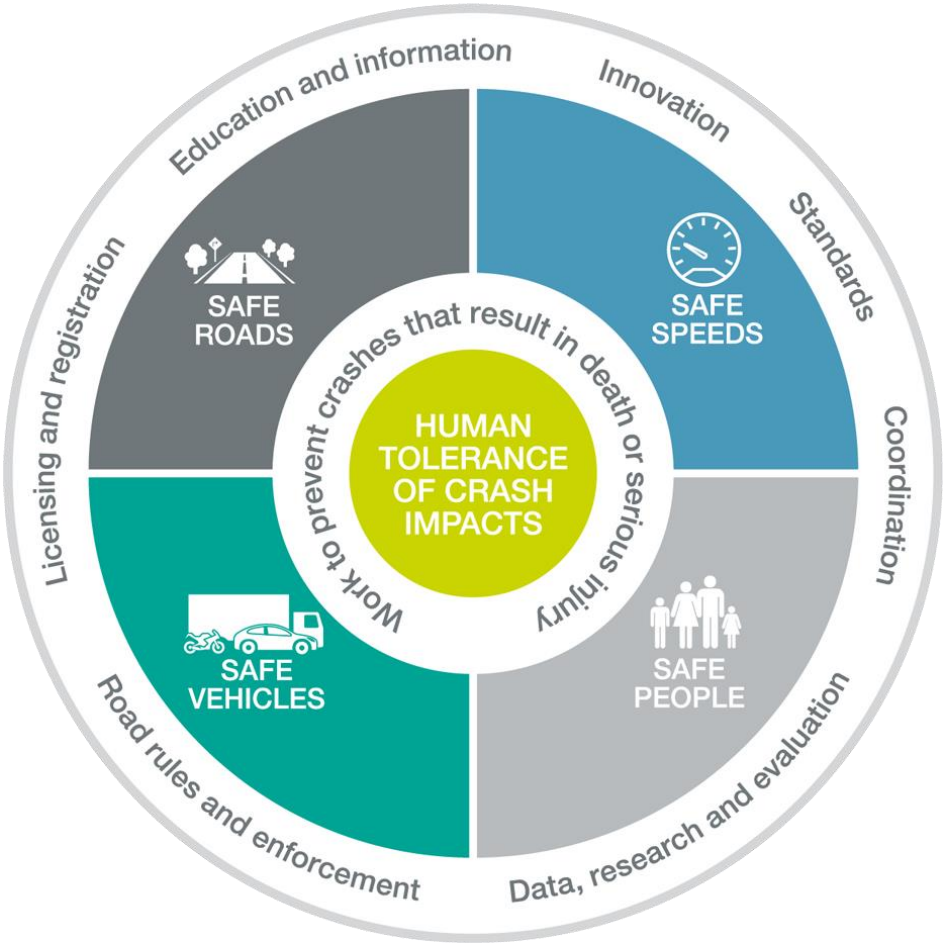
people died in one year on roads in Danube area**

# 133,786

people got seriously injured annualy costing up to 2% of countries' GDP**

**RADAR raw data incl. Hr,Hu,Si,Md,Bg,Srb,BiH,A

# To improve situation RADAR is:




…having Safe System approach at its heart:

5* drivers

5* cars

5* roads

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# RADAR is saving LIVES by

implementing **learning** and **transnational cooperation** activities **to help** the responsible **road safety organizations** in the Danube area **identify risk** on their road networks and helps them **reduce risk systematically** by improving infrastructure and road layout.

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# RADAR Partnership

**RADAR** – Risk Assessment on Danube Area Roads

**10** Project Partners

**12** Associated Partners

**13** Countries


…to **improve the road infrastructure safety** in the region by **raising capacity** and **enhancing transnational cooperation** in the sector for all road users .

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# Project identity

2nd Call DTP

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June 2018
May 2021


**Better connected and energy responsible Danube region**

€ 1.523.064 ERDF

€ 210.307 IPA

€ 96.262,5 ENI

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# Project outputs

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- Develop **Road Safety Procedures Training Concept,** deliver **Training Courses** and perform **Study Visits**

- Establish **Road Safety Expert Group** that will work on the following **Road Safety Thematic Areas**

- Deliver **Danube Infrastructure Road Safety Improvement Strategy and Action Plan** that will be adopted by ASPs

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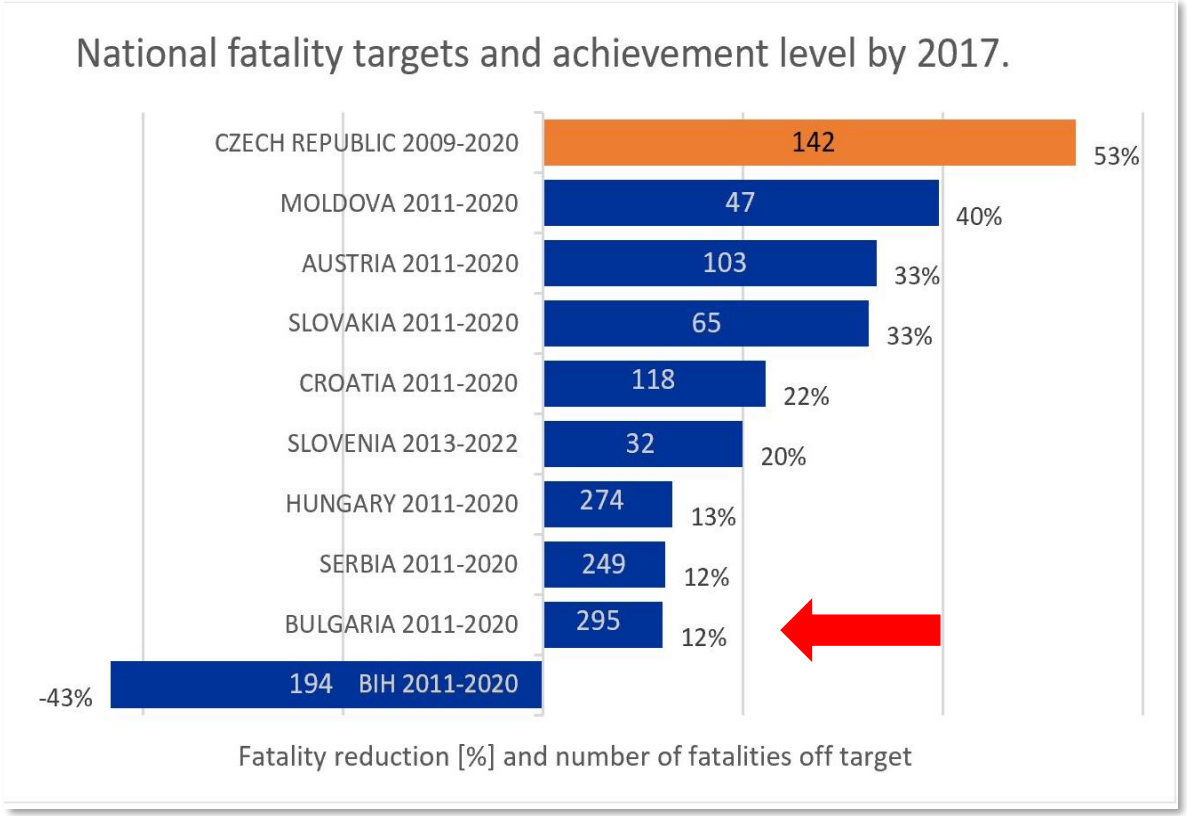
# National fatality targets

| National fatality targets | | | | |
|---|---|---|---|---|
| | Fatality target by 2020* | | Severely injured target by 2020* | |
| | Number of fatalities per mil. inhabitants | Fatality reduction percentage | Number of severely injured per mil. inhabitants | Severely injured reduction percentage |
| **Slovenia** | 35 | | 230 | |
| **Croatia** | 51 | 50% | No target set | No target set |
| **Hungary** | 38 | 50% | No data | 50% |
| **Czech Republic** | 34 | 60% | 197 | 40% |
| **Bulgaria** | 55 | 50% | 896 | 20% |
| **Austria** | 35 | 50% | 610 | 40% |
| **BIH** | 30 | 50% | No target set | No target set |
| **Serbia** | 47 | 50% | 276 | 50% |
| **Moldova** | 64 | 50% | No data | 50% |
| **Slovakia** | 34 | 50% | No target set | No target set |

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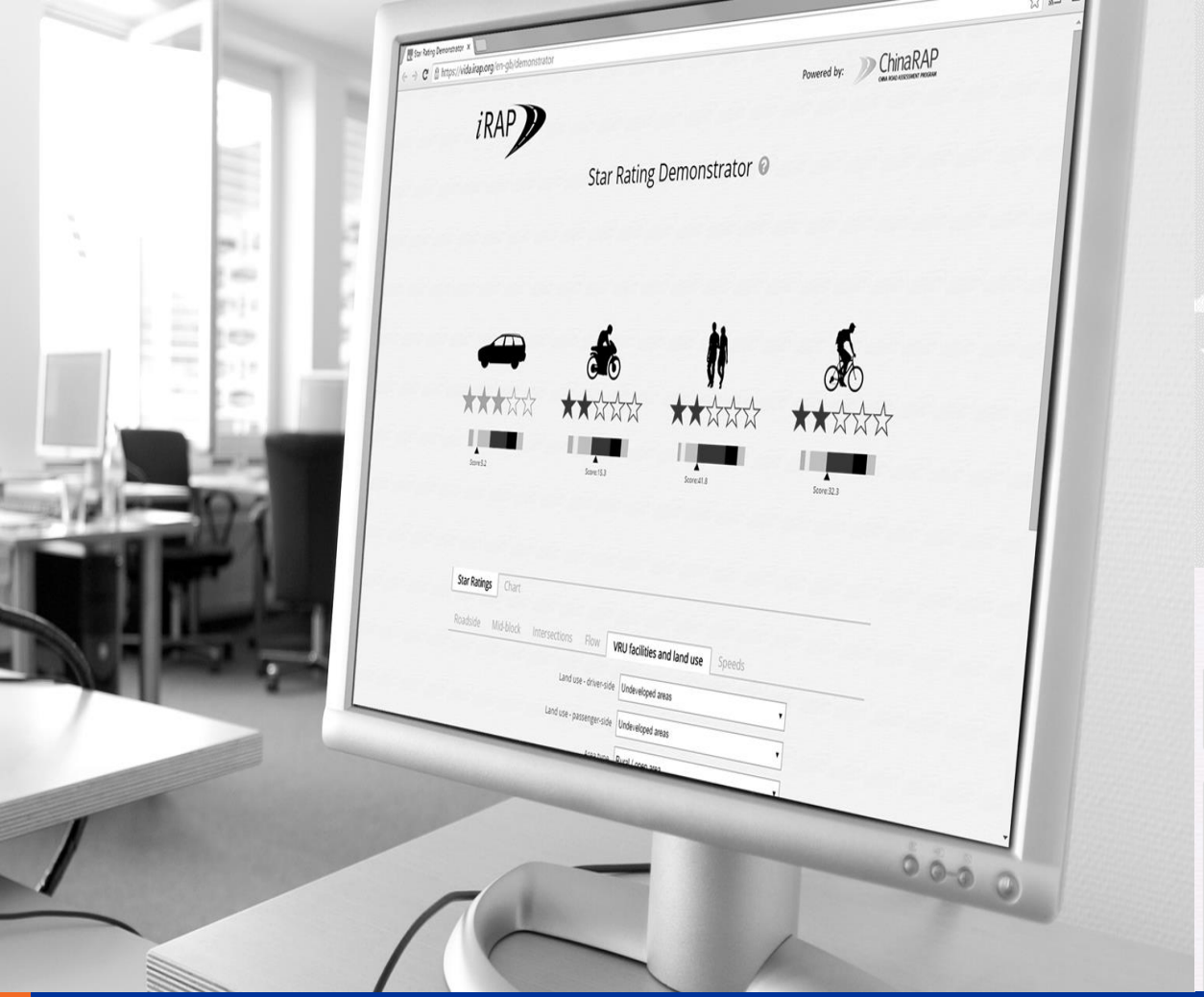



## Safer Roads Investment Plan

Currency: £ GBP - Analysis Period: 20 years

| Total FSIs Saved | Total PV of Safety Benefits | Estimated Cost | Cost per FSI saved | Program BCR |
|---|---|---|---|---|
| 2,285 | 674,166,686 | 335,141,664 | 146,697 | 2 |

| Countermeasure | Length / Sites | FSIs saved | PV of safety benefit | Estimated Cost | Cost per FSI saved | Program BCR |
|---|---|---|---|---|---|---|
| Roadside barriers - passenger side | 2,217.20 km | 2,014 | 594,339,491 | 307,953,475 | 152,901 | 2 |
| Street lighting (intersection) | 347 sites | 110 | 32,429,893 | 12,746,727 | 115,988 | 3 |
| Roadside barriers - driver side | 68.20 km | 83 | 24,529,155 | 9,587,693 | 115,343 | 3 |
| Pedestrian fencing | 90.50 km | 43 | 12,730,796 | 659,580 | 15,289 | 19 |

# Thematic Area TA1:General road sections safety and maintenance upgrading using Safer Roads Investment Plans

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# How much is spent on infrastructure safety (and how much needs to be spent)?

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Often difficult to understand how much is spent – data often presented as:

- "**traffic management, maintenance and road safety**"
- "**road improvements and road safety**"

**How much is for congestion-reduction, reducing operating costs and pavement fixing?**

Road safety measures **only reduce crashes** if matched to existing risk

- So, need to know the risk – either types of crashes and where …or

# What does SENSoR tell us? Where and how to spend


Typically 50-70% of roads individual countries score 1 or 2 stars for vehicle occupants

93% of roads where pedestrians are present and speed flows at 40km/h or more have no footpath

97% of roads where bicyclists are present and traffic flows at 40km/h or more have no bicycle facilities

56% of roads carrying traffic at 80km/h or more are undivided single carriageways

85% of curves where traffic flows at 80km/h or more have hazardous roadsides

68% of intersections where traffic flows at 60km/h or more have no roundabout, protected turn lane or interchange

# Safer Roads Investment Plans (SRIPs)

Money for **new** or improved roads always limited

Must spend **existing** funds wisely to **reduce casualties**

**Where to** spend, **what to** spend, **how to** spend?

Knowing the **costs and benefits** of spending

Having **data to support decisions** – eg. often where the **crash data are poor**

# **Where** and **how** to spend?


## **Bulgaria** measures included:

Median and roadside barriers, road widening, shoulder rumble strips and sealing, white lining, re-surfacing, footpath provision for pedestrians

# SENSoR – fatal & serious injuries (FSIs) saved in 20 years by main injury-reducing benefits

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| Country | Side barriers | Shoulder treatment /marking | Median barrier | Pedestrian provision | Road surface | Sign/line including inter-sections |
|---|---|---|---|---|---|---|
| Albania | 2,960 | 1,250 | 130 | 620 | 910 | 840 |
| Bosnia & Herzegovina | 680 | 520 | -- | 427 | -- | 110 |
| Bulgaria | 3,600 | 2,500 | 3,120 | 3,960 | 2,190 | 1,810 |
| Croatia | 820 | 480 | 72 | 326 | -- | 180 |
| Former Yugoslav Republic of Macedonia | 1,380 | 470 | -- | -- | 219 | 226 |
| Greece | 6,220 | 5,230 | 8,100 | 1,240 | 3,110 | 570 |
| Hungary | 3,370 | 3,450 | 1,890 | 2,220 | 1,730 | 1,010 |
| Montenegro | 1,040 | 188 | -- | -- | 130 | 226 |
| Republic of Moldova | 1,150 | 4,450 | -- | 1,840 | 260 | 1,310 |
| Romania | 2,260 | 1,440 | 4,680 | 2,310 | 430 | 690 |
| Serbia | 279 | 252 | 49 | 173 | 0 | 62 |
| Slovakia | 2,310 | 1,590 | 1,740 | 1,288 | 1,070 | 406 |
| Slovenia | 2,620 | 490 | 100 | -- | 65 | 45 |
| Ukraine | 590 | 1,230 | 1,180 | 4,120 | -- | 1,520 |
| Total | 29,279 | 23,542 | 21,061 | 18,524 | 10,011 | 8,799 |

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# Thematic Area TA2: Provision for vulnerable road users (pedestrians and cyclists)

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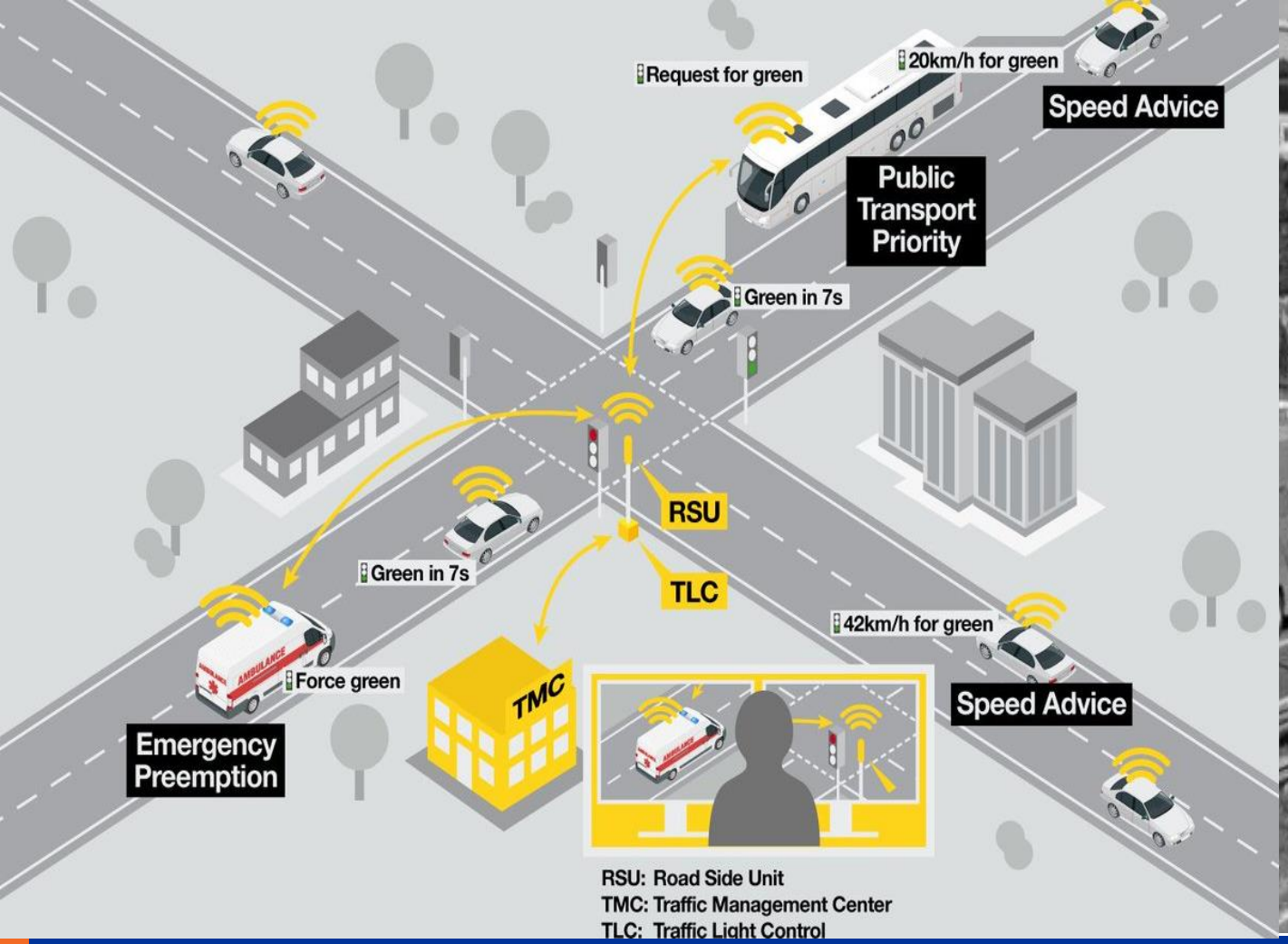


# Thematic Area TA3: ITS, speed management and traffic calming approaches

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# Thematic Area TA4: Infrastructure safety of roads passing or in the neighbourhood of schools

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# Activity 3.2 Training material and software translations

Translation of all training materials and the contents of e-platform ViDA tool for road safety measuring.

Translations were prepared for following national languages: Bulgarian, Czech/Slovakian, German, Hungarian, Moldovan/Romanian, Serbian/Croatian/Bosnian and Slovenian.

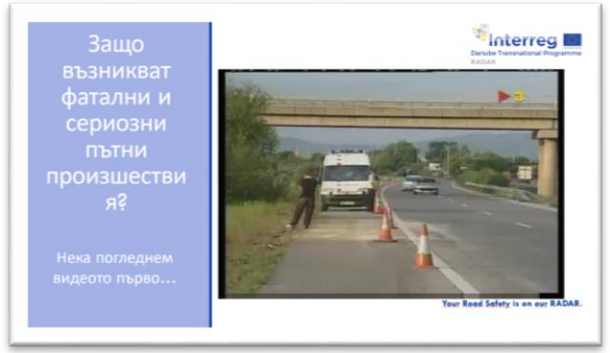
D.3.2.1 Translated ViDA tool - delivered

- ViDA online software – 89.000 characters

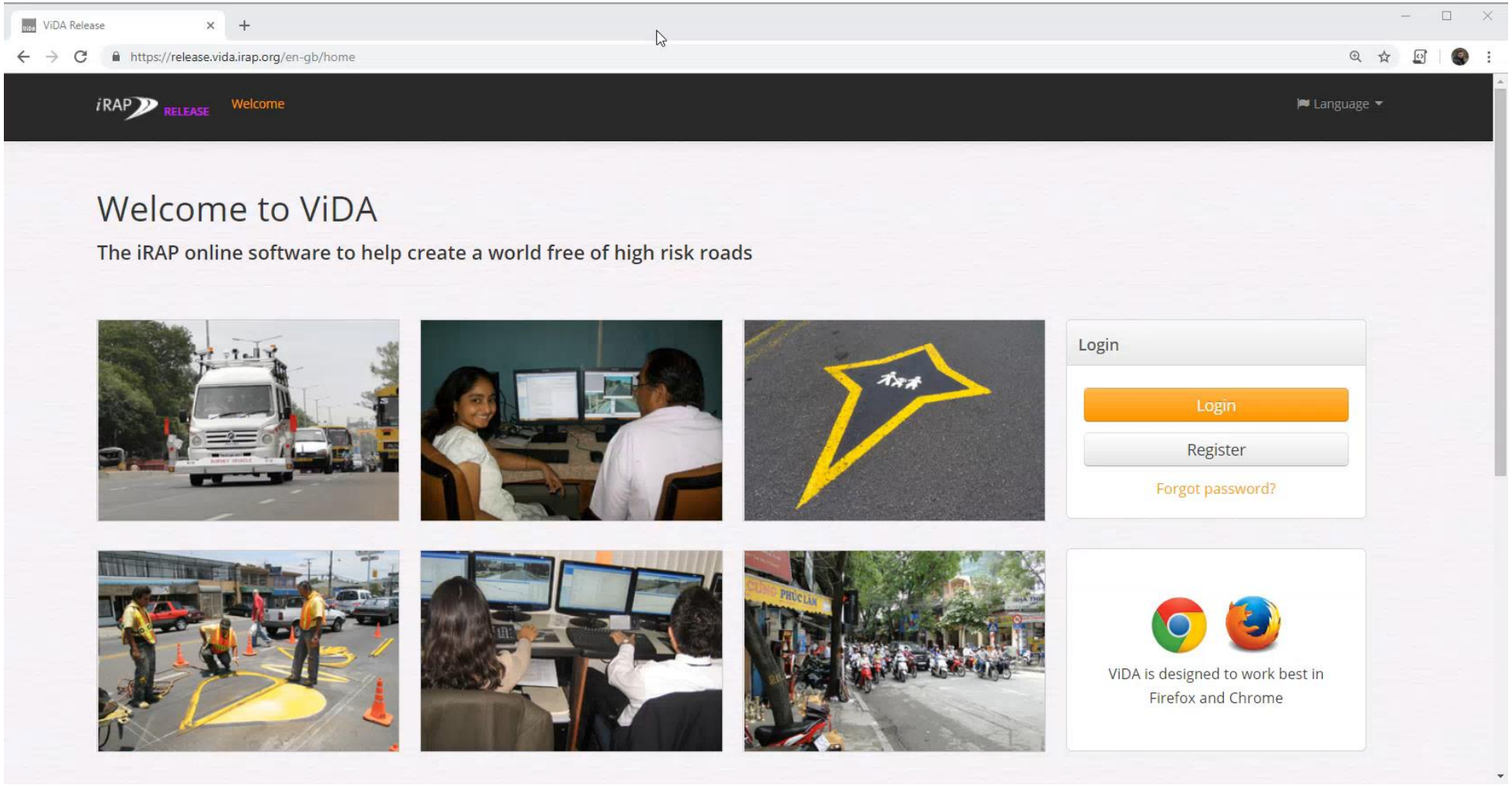
D.3.2.2 Translated training materials - delivered

- iRAP Star Rating Coding Manual – 97.000 characters
- Power Point slides – 77.000 characters - delivered





# D.3.2.1 Translated ViDA tool



# RADAR Road Safety Training Slovenia

- 22. & 25.-26. March 2019, AMZS, Ljubljana
- 64 participants over 3 days of training

- Jure Kostanjšek, AMZS
- Marko Ševrović, EIRA
- Klemen Filipič, AMZS

- Ministry of infrastructure
- Faculty of Civil Engineering
- Engineering companies
- Road Designers
- Licensed Road Safety Auditors

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# Day 1, March 22nd, 2019


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# Day 2, March 25th, 2019

# Day 3, March 26th, 2019


# 3-day training in Croatia

2-4. April 2019. at University of Zagreb Faculty of Transport and Traffic Sciences

26 participants - group of approx. 20 attendees per day

Great response – almost all invited have attended the training course

National public authorities

Ministries

Road authorities

NGO's

Road safety engineers

County road authorities

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# *RADAR three-day training courses*

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**Training SLOVENIA**
22.3, 25.-26.3.2019.

**Training BOSNIA**
29.-31.5.2019.

**Training BULGARIA**
11.-13.6.2019.

**Training AUSTRIA**
16.-18. 9.2019.

**Training HUNGARY**
8.-10.10.2019.


**Training CROATIA**
2.-4.4. 2019.

**Training MOLDOVA**
28.-30.5.2019.

**Training CZECH REPUBLIC**
1.- 3. 10. 2019.

**Training MONTENEGRO**
25.-27.6.2019.

**Training SERBIA**
12.- 14. 11. 2019.

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| | SESSION | ACTIVITIES |
|---|---|---|
| Day 1 | **1. Introduction** | |
| | 1.1. Introduction to RADAR and RAP Methodology (60 min.) | ▪ Basic road safety assessment concepts<br>▪ Traffic accidents occurrence risk<br>▪ Causes of fatal and serious traffic accidents<br>▪ Examples of dangerous locations on road network |
| | **2. Basic concepts of road safety risk assessment and safer road investment plan development** | |
| | 2.1. Overview of Star Rating Process (60 min.) | ▪ Basic Elements of Star Rating<br>▪ Project planning, Data Collection, Star Rating Calculation, Results review and analysis |
| | 2.2. Risk Mapping and Performance tracking (30 min.) | ▪ Input data<br>▪ Risk mapping methodology process<br>▪ Data collection and assignment<br>▪ Risk Map types<br>▪ Risk rates calculations<br>▪ Risk Map comparison |
| | 2.3. SRIP and Implementation ready conceptual design layouts (60 min.) | ▪ Creating SRIP plans<br>▪ SRIP economic analysis – basic concepts |
| | **3. Discussion (30 min.)** | |

| | SESSION | ACTIVITIES |
|---|---|---|
| Day 2 | **1. Introduction to Road survey process** | |
| | 1.1. Star Rating Survey - Video inspections (30 min.) | ▪ Inspection Technology<br>▪ Example of inspection systems<br>▪ Examples of images collected by unaccredited and accredited road survey system<br>▪ Survey process planning<br>▪ Quality assurance |
| | **2. Introduction to VIDA – iRAP online software** | |
| | 2.1. Registering and using VIDA (30 min.) | ▪ ViDA registration<br>▪ ViDA login<br>▪ Using the ViDA SRS Demonstrator |
| | **3. Introduction to road Coding and SRS model** | |
| | 3.1. Coding process – basic concepts (45 min.) | ▪ The coding process – Road attribute groups<br>▪ Star Rating Score (SRS) equations<br>▪ Fatality estimation equations |
| | 3.2. Introduction to road attribute coding (45 min.) | ▪ Coding system<br>▪ Basic principles of coding<br>▪ Coding of Designs |
| | **4. Practical coding Exercises** | |
| | 4.1. Interactive exercises – coding the selected 100m road segment in ViDA Demonstrator (90 min. | ▪ Coding examples of different road sections |

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| | SESSION | ACTIVITIES |
|---|---|---|
| Day 3 | **1. Safer Roads Investment Plans** | |
| | 1.1. Safer Roads Investment Plans – advanced concepts (60 min.) | ▪ Countermeasure types<br>▪ Calculating the economic benefits and costs<br>▪ BCR ratios and prioritisation of countermeasures<br>▪ Using the ViDA Trigger sets<br>▪ Defining the economic parameters in ViDA<br>▪ Dataset calibration |
| | 1.2. Quality review and interpretation of safer roads investment plans (60 min.) | ▪ Countermeasure checks<br>▪ Makro and micro checks<br>▪ Casualty map<br>▪ Exploring the issues in star rating, engineering standard issues and maintenance issues |
| | **2. Using ViDA and Interpreting results** | |
| | 2.1. Registering and using VIDA (105 min.) | ▪ Using the SRS Demonstrator – advanced examples<br>▪ Data Filtering in ViDA<br>▪ SRS Map, SRS Table, SRS Chart, Risk worm<br>▪ Detailed condition Report<br>▪ SRIP Table, SRIP Plan and Predicted Casualty Map<br>▪ Using the Advanced project settings and Dataset calibration |
| | **3. Supporting Data collection** | |
| | 3.1. Collecting and using the supporting data in the post-coding process (45 min.) | ▪ Demographic and economic data<br>▪ AADT data, motorcycle, bicycle and pedestrian flow data<br>▪ Road traffic accidents data<br>▪ Operating speed data |
| | **4. Discussion** | |

| | SESSION | ACTIVITIES |
|---|---|---|
| Day 4 | 1. Thematic Area 1 – General road safety and SRIP | |
| | 1.1. Webinar – presentations on Thematic Area 1 | ▪ Examples of existing sections and design files that will demonstrate how RAP tools can be used to prepare implement measures form TA1 |
| | 2. Thematic Area 3 – ITS, speed management and traffic calming approaches | |
| | 2.1. Webinar – presentations on Thematic Area 3 | ▪ Examples of existing sections and design files that will demonstrate how RAP tools can be used to prepare implement measures form TA3 |
| | **SESSION** | **ACTIVITIES** |
| Day 5 | 1. Thematic Area 2 – Provision for Vulnerable Road Users | |
| | 1.1. Webinar – presentations on Thematic Area 2 | ▪ Examples of existing sections and design files that will demonstrate how RAP tools can be used to prepare implement measures form TA2 |
| | 2. Thematic Area 4 – Infrastructure safety of roads in the neighbourhood of schools | |
| | 2.1. Webinar – presentations on Thematic Area 4 | ▪ Examples of existing sections and design files that will demonstrate how RAP tools can be used to prepare implement measures form TA4 |

# Thank you for your kind attention!

# … и очакваме Ви на месец юни на тренировките по РАДАР в България

Dr. Marko Ševrović| Senior Road Safety Engineer| EIRA - EuroRAP

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