TRANSPORT COMMUNITY

PS/SRV/RSO/016/2021

Phase 2 Report

November 2022

Design, implementation and maintenance of the Information System for the Western Balkans Road Safety Observatory (WBRSO)

Develop

Issue and revision record

Revision	Date	Originator	Contributors	Approver	Description
1	04/11/2022	Miroslav Petrović (Project Manager)	Ognjen Simić (KE3), Vukašin Grubić (NKE), Sara Radosavljević (NKE), Sara Radovanović (NKE)	Miroslav Petrović	Draft Phase 2 Report
2	14/11/2022	Miroslav Petrović (Project Manager)	Ognjen Simić (KE3), Vukašin Grubić (NKE), Sara Radosavljević (NKE), Sara Radovanović (NKE)	Miroslav Petrović	Incorporated changes in software based on feedback from TCT
3	29/11/2022	Miroslav Petrović (Project Manager)	Ognjen Simić (KE3), Vukašin Grubić (NKE), Sara Radosavljević (NKE), Sara Radovanović (NKE)	Miroslav Petrović	Incorporated changes based on feedback received from TCT
4.	04/12/2022	Miroslav Petrović (Project Manager)	Ognjen Simić (KE3), Vukašin Grubić (NKE), Sara Radosavljević (NKE), Sara Radovanović (NKE)	Miroslav Petrović	Incorporated minor changes based on feedback received from TCT

Contents

List of Abbreviations

Abbreviation	Meaning
API	Application Programming Interface
CADAS	Common Accident Dataset
EU	European Union
FIA	Fédération Internationale de l'Automobile
HTTPS	Hypertext Transfer Protocol Secure
IP	Internet Protocol
JSON	JavaScript Object Notation
JWT	JSON Web Token
KE	Key Expert
MKD	North Macedonia
NKE	Non-Key Expert
RDBMS	Relational Database Management System
RP	Regional Partner
SEE	South Eastern Europe
SoW	Scope of Work
SRB	Serbia
TCP	Transmission Control Protocol
TCT	Transport Community
TCTPS	Transport Community Permanent Secretariat
TEN-T	Trans-European Network - Transport
TODIS	Transport Observatory Database Information System
UI/UX	User Interface / User Experience
WB	Western Balkan
WB	Western Balkans Regional Partners
WHO	World Health Organization
WBRSO	Western Balkans Road Safety Observatory

List of figures

1 Executive Summary

Under the Project PS/SRV/RSO/016/2021 and relevant Contract signed on 17.12.2021, the Contractor has been assigned to perform tasks related to Design, implementation and maintenance of the Information System for the Western Balkans Road Safety Observatory (WBRSO).

Project commencement date was 04.02.2022. and, according to the Scope of Work (SoW), the publication of the Phase 1 Report effectively concludes the Development of the model architecture of the database phase of the assignment *Design, implementation and maintenance of the Information System for the Western Balkans Road Safety Observatory (WBRSO)*.

The information collected so far enable Contractor to continue with the next project phase – Development of Information System:

- Establishment of the database
- Development of the web and mobile app
- Installation of information system
- Population of the database.

These activities resulted in the next project deliverable - Phase 2 Report, which include the following elements:

- Installation of Information System
- Population of the database
- Manual for IT administrator and users
- Training sessions

In the incoming sections, these topics are addressed in more detail.

2 Synopsis

Project title:	Design, implementation and maintenance of the Information System for the Western Balkans Road Safety Observatory (WBRSO)
Project Number:	PS/SRV/RSO/016/2021
Contract number:	837-05-2021
Contracting Authority:	The Permanent Secretariat of Transport Community
Region:	South Eastern Europe (SEE)
Contractor:	Develløp d.o.o.
Contract signed:	17.12.2021.
Project commencement date:	04.02.2022.
Project duration:	10 months (implementation) + 12 months (maintenance)
Anticipated completion:	04.12.2022. (implementation) + 04.12.2023. (maintenance)
Contractor's responsible person:	Miroslav Petrović
Project office:	Kneginje Zorke 2 Belgrade Serbia
Telephone:	+381 (0) 11 381 2000

2.1 Project Purpose and Objective

Under the Treaty establishing the Transport Community, the South East European (SEE) Parties (namely the Republic of Albania, Bosnia and Herzegovina, Kosovo*, Montenegro, North Macedonia and the Republic of Serbia, hereinafter referred as "Regional Parties") have committed to ensure the development of the indicative extension of the Trans-European Network - Transport (TEN-T) comprehensive and core networks to the Western Balkans (WB), in view of their commitment to progressively integrate their transport markets with the European Union's, based on the relevant acquis.

Under the provisions of the Treaty of the Technical Committee on Road Safety, upon the establishment, a short-term action plan was drafted. Road Safety Observatory is one of the measures in the Action Plan named 'Establishing a Tool for monitoring road safety performance under the Transport Community umbrella'.

The ultimate goal in establishing Western Balkans Road Safety Observatory (WBRSO) aims to offer a platform for exchange of information and strategies, action plans and initiatives in road safety at a regional level and the collection of timely, objective and reliable information that effectively contributes to achieving a reduction in road casualties.

Evidence-based approaches lie at the heart of the most successful road safety policies and measuring the progress towards reducing the number of road casualties will lead to improved knowledge on road safety performance as a crucial element for the design of road safety strategies. It will build knowledge on the improvement of the national crash data systems and harmonization of the data with the Common Accident Dataset (CADAS) protocol, contribute to improvement of the road safety data in the region and their harmonisation.

Having this data on a single place will provide evidence-based data to policy makers, thus making the process of defining the gaps easier and more accurate, leading to the ultimate goal - reducing the number of serious injuries and road traffic deaths and improving overall road traffic safety in region.

It is expected that by the end of 2022, Road Safety Observatory covering the Western Balkans region will be set up within the Permanent Secretariat of Transport Community. This observatory will focus on data issues only since policy decisions will be handled by the Transport Observatory Database/Information System (TODIS) which is in process of development and will be under the Transport Community umbrella.

* This designation is without prejudice to positions on status, and is in line with UNSCR 1244 (1999) and the ICJ Opinion on the Kosovo declaration of independence.

2.2 Project Context and Background Information

The Western Balkans Road Safety Observatory (WBRSO) presents a platform aiming to offer a tailored solution, monitor road safety targets, and contribute to improvement and harmonised road safety data in the region. Improved knowledge on road safety performance presents crucial element for the design of road safety strategies and, at the same time, measurement of the progress towards reducing the road casualties.

One of the main goals of the WBRSO is to ensure that road safety data obtained from the six Regional Partners reaches enough quality and breadth of coverage to facilitate a smooth transition into EU's CARE database.

2.3 The Team of Experts

The Contractor has relevant pool of in-house experts competent for this assignment. In that sense, initial mobilization of experts has been already done by allocating 5 of them. It is anticipated that additional experts will be allocated throughout the project, mainly for software development and quality control purposes.

	Position	Status	Name
1	Team Leader/Project Manager	Key Expert 1 (KE1)	Miroslav Petrović
2	Senior Web Application Developer	Key Expert 2 (KE2)	Nikola Glišić
3	Senior Database Developer	Key Expert (KE3)	Ognjen Simić
4	System Architect	Non-key Expert (NKE)	Marko Nikolić
5	Senior Web Application Developer	Non-key Expert (NKE)	Vukašin Grubić

2.4 Internal Process for Quality Assurance

Quality assurance is provided by the Company's relevant system in place (ISO 9001 and ISO 27001 certified). In particular, for the scope of this specific project, before official submission of project deliverables/reports, drafts or final, quality assurance is ensured internally. Therefore, before any official submission of deliverables, approval from at least one reviewer should be acquired.

This will be documented in a Document list keeping track of documents, version tracking and authority for checking and approval.

Finally, as the main outcome of the project is software application, additional procedures for software quality assurance will be used, with set of tests performed for each software release, in accordance with standard Contractor's practice and quality procedures in place.

3 Installation of Information System

3.1 Model architecture

The system is set as three-tier architecture.

Three-tier architecture is a well-established software application architecture that organizes applications into three logical and physical computing tiers:

- the presentation tier, or user interface;
- the application tier, where data is processed; and
- the data tier, where the data associated with the application is stored and managed.

The main benefit of three-tier architecture is that because each tier runs on its own infrastructure, each tier can be developed simultaneously by a separate development team, and can be updated or scaled as needed without impacting the other tiers.

In a three-tier application, all communication goes through the application tier. The presentation tier and the data tier can not communicate directly with one another.

PRESENTATION TIER

The presentation tier is the user interface and communication layer of the application, where the end user interacts with the application. Its main purpose is to display information to and collect information from the user. This top-level tier can run on a desktop computer or mobile devices such as phones, tablets, etc.

APPLICATION TIER

The application tier, also known as the logic tier or middle tier, is the heart of the application. This tier processes information collected in the presentation tier using a specific set of business rules. It is also responsible to prepare data for various reports in presentation tier. The application tier can also add, delete or modify data in the data tier.

The application tier will communicate with the presentation tier through REST API (Application Programming Interface) using JSON (JavaScript Object Notation) . Each request will contain JWT token with limited duration for authentication which is previously generated when user is authenticated.

DATABASE TIER

The database tier is where the information processed by the application is stored and managed. This will be implemented with a Relational Database Management System (RDBMS).

RDBMS will support a full-scale automatic replication and back up/recovery capabilities.

3.2 Frontend

For the frontend – presentation tier Angular version 14.1.3 framework has been used. This approach enables that the application can be viewed using any browser, achieving maximum speed with Web platform via Web Workers and server-side rendering. Angular framework also provides control over scalability and can meet fully data application requirements.

3.3 Backend

The application is running on the servers provided by Contractor, but it is foreseen that it should be migrated onto TCTPS's infrastructure once it is available.

- Database: PostgreSQL version 12
- Programming language: Java version 8
- Framework: Spring Boot.

3.4 Mobile application

A dedicated mobile application has been developed for this project. It uses React Native framework version 0.69.4, which enables creation of native mobile applications for Android and iOS operating systems. Once deployed under the account of Transport Community, it will be possible to download application via Play Store for Android or App store for Apple mobile phones for any user free of charge.

3.5 Acceptance Testing Plan

Testing plan includes:

- use cases description (scope / functionality)
- testing sequence (steps)
- testing resources and acceptance criteria (result)

Test Number	Scope/functionality	Steps	Result
Test 1	User log in	Click Log in link. Enter correct Email and password. Click LOGIN button.	Successful login
Test 2	User tries to log in with wrong credentials	Click Log in link. Enter wrong Email or password. Click LOGIN button	Error: Wrong email or password

Test 3	Adding new user	When logged in as Regional Coordinator, click on Settings and Users tab. Then click on ADD NEW USER button. Input all data for New account. All fields are required. Click the button SAVE	Successful creation of the new user.
Test 4	Adding new user – form fields verification	When inputting data for the new user, if you miss a field and click SAVE button	Missing field will be emphasized to note that it too must be filled.
Test 5	Adding new report	Click on Reports tab. Click on ADD NEW REPORT button. Enter the year of the report.	Successful creation of the report
Test 6	Filling out Report (as Regional Coordinator)	Select the report you wish to input collected data for. Then you will be taken to questionnaire. Here you can select which questionnaire you will be filling out. Select number of the questionnaire. Start filling data. Click SAVE AND CONTINUE when you're done	Successful completion of the section of the questionnaire.
Test 7	Completing the report	When all the questionnaires are completed click COMPLETE button to finish the report.	Successfully completing report. Status changed from CREATED to COMPLETED.
Test 8	Filling out Report (as Sector Representative)	Select the report you wish to input collected data for.	Successfully completing the questionnaire.

		Then you will be taken to questionnaire. Here you can select which questionnaire you will be filling out. Select number of the questionnaire. Start filling data. Click SAVE AND CONTINUE when you're done	Status changed from X to COMPLETED.
Test 9	Completing report – fails	Click the COMPLETE button	You will be returned to the questionnaire that has not been completed. You will need to fill all the required data (marked in red) so that process of completion may be finished.

The Contractor has successfully carried out all tests provided by the Acceptance Testing Plan listed above.

4 Population of the database

4.1 Database structure

The data collection process is foreseen to collect the data on an annual basis.

The data collection always refers to the year before and it is related to the time when the official data are made public. The Contractor will populate the database with data already collected from the TCT Secretariat for the years 2019, 2020 and 2021 (if data are ready) and make an inter-phase for importing them into WBRSO database. For the rest of the data, a data entry phase will be used. For the data entry process, the Contractor will use it as a pilot phase for testing the WBRSO application.

The image below presents the structure of the database.

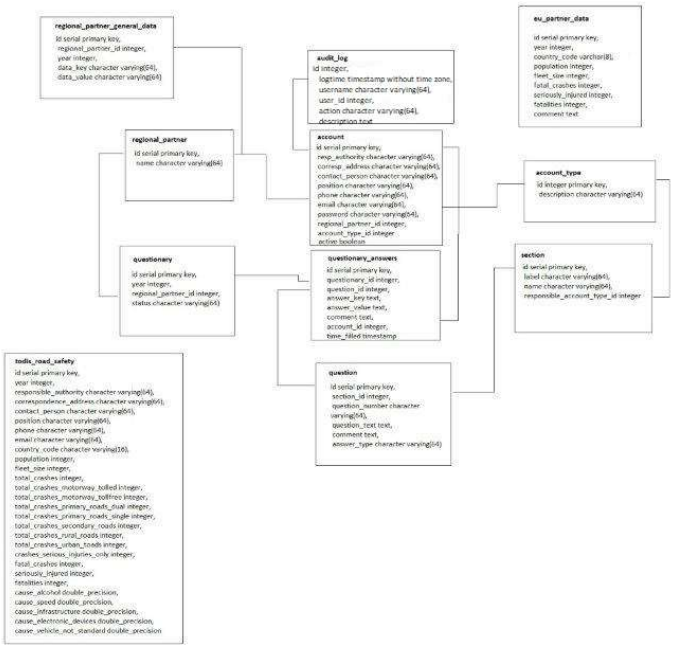

Figure 1: Structure of the database

4.2 Logging in

The data population phase, especially the data entry procedure, will be used as a training period for the users from different institutional authorities that will feed the system in the future.

Data entry procedure is enabled for authorized users only, where they have to log in. The home page with *Sign in* button on the top right side of the page is presented below.

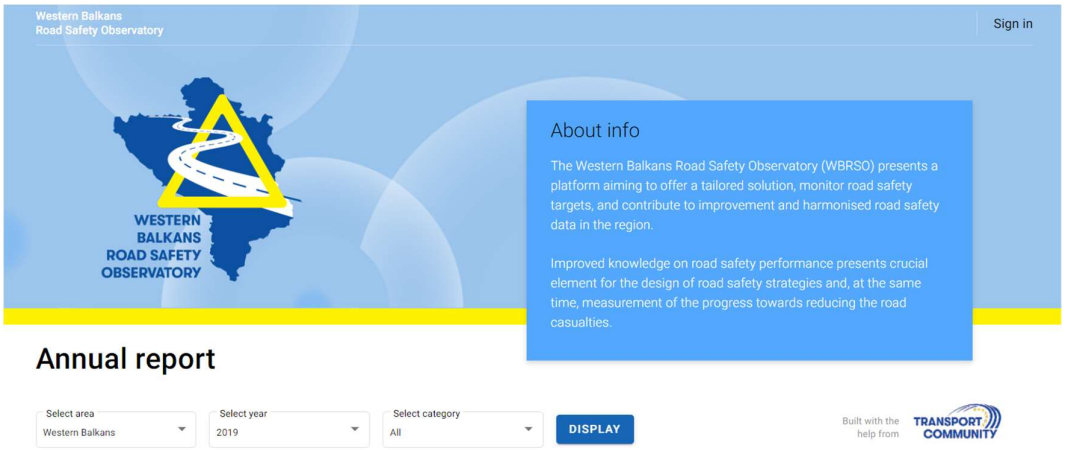

Figure 2: Home page

A popup window asking for credentials: email and password will appear.

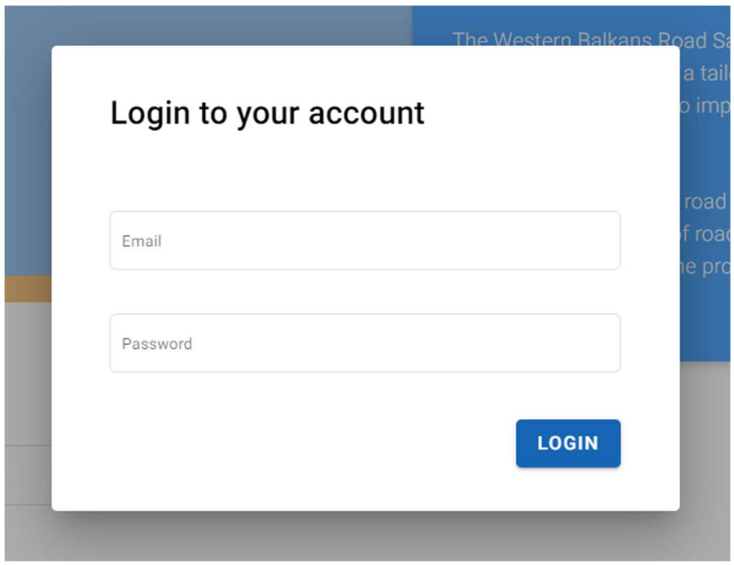

Figure 3: Popup

If the user enter the wrong email or password, the error message will appear at the bottom of the screen.

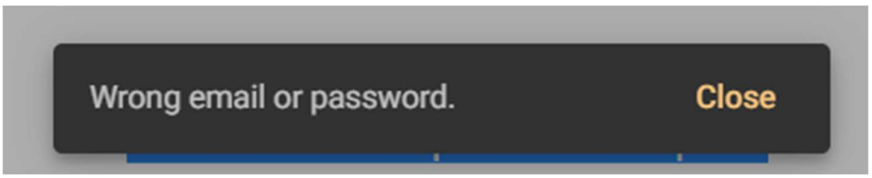

Figure 4: Error message

After you login with correct credentials, popup will close and you'll be able to use functionalities of the application. Login button is now changed to logout button if you wish to log out.

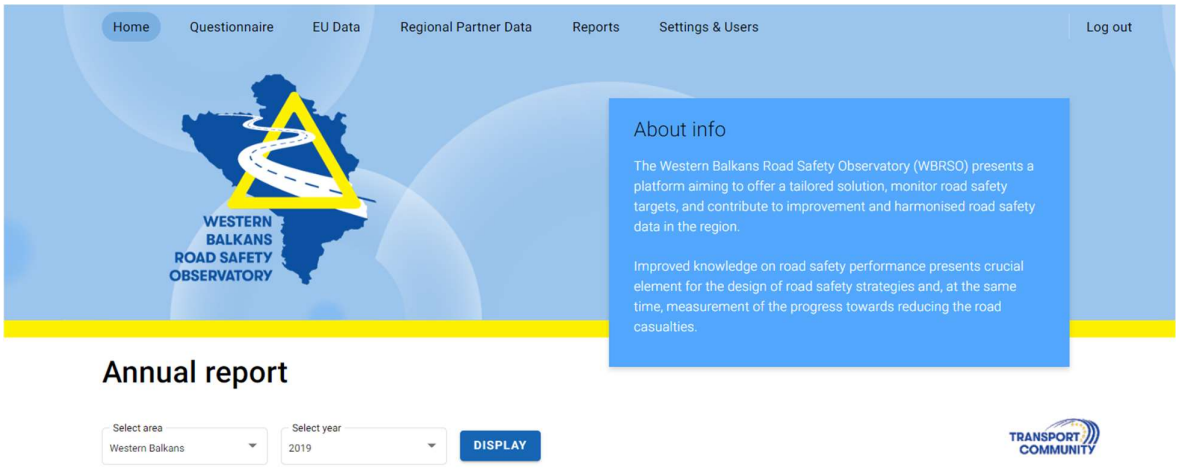

Figure 5: Logged in home page

4.3 Adding new questionnaire

To add a new questionnaire simply go to the Questionnaire tab of the navigation banner. There you'll see a button with ADD NEW QUESTIONNAIRE title.

Figure 6: Add a new questionnaire

After clicking the ADD NEW QUESTIONNAIRE button it is required to select the year for which the data will be entered.

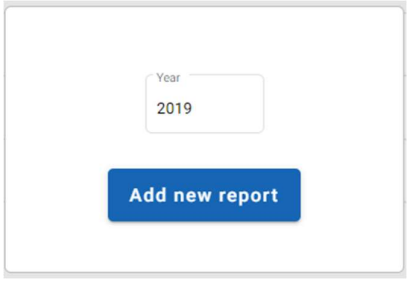

Figure 7: Add new report

When an account which belongs to Regional Coordinator category of the user is used, all sections of the questionnaires are displayed. For other categories of users from different sectors (police, traffic, health), a subset of these questions will be displayed.

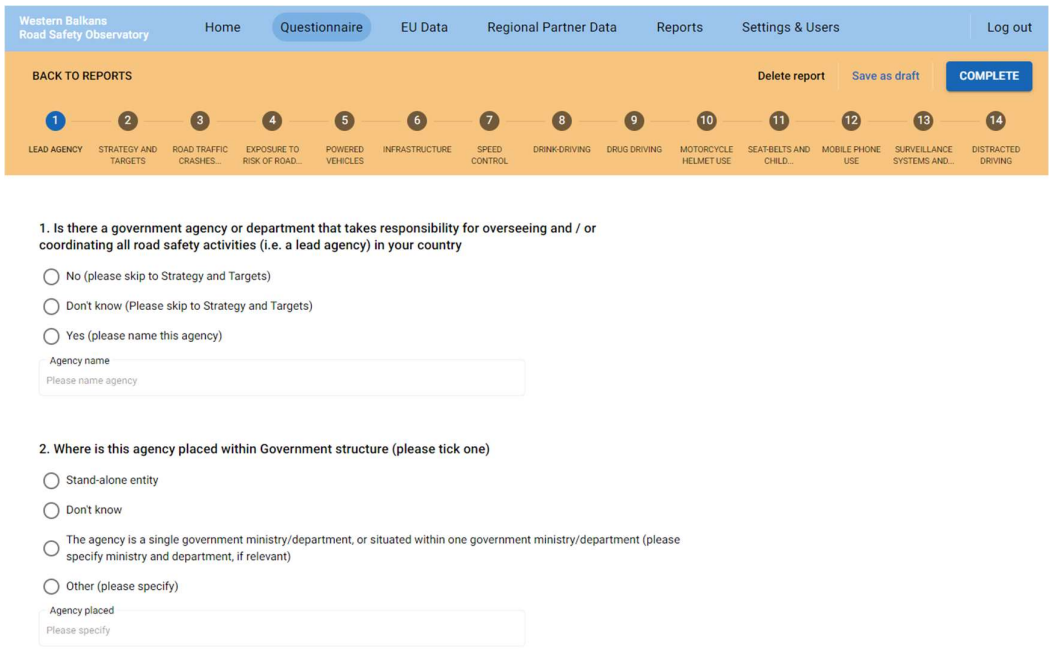

Figure 8: Questionnaire data input

If all required fields are not filled in with data, the report cannot be completed and the user will be taken to the question that needs data entry, as shown on the next picture.

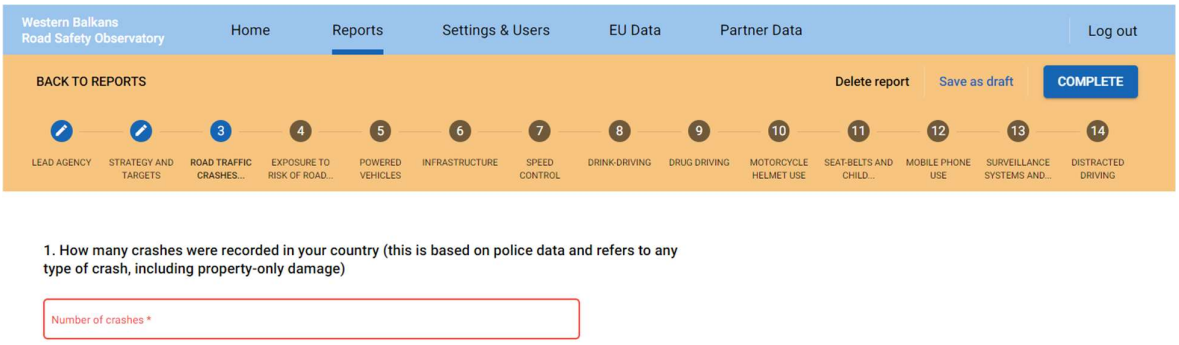

Figure 9: Indication of missing mandatory field

For each user role different questionnaire will be displayed. Each Sector Representative must click the COMPLETE button after inputting data. This step is necessary for the Regional Coordinator to able to click final COMPLETE button for the questionnaire to be finished.

Sector Representative's input status can be seen on table below. When Sector Representative completes their part of the questionnaire status will change from red x to green checked sign.

2019	CREATED	North Macedonia	✗	✗	✗
2019	IN PROGRES	Serbia	✗	✗	✓
2016	CREATED	Montenegro	✗	✗	✗
2015	COMPLETED	Serbia	✓	✓	✓

Figure 10: Status change

5 Manual for IT administrator and users

WBRSO web application

5.1 Adding new user

To add a new user, ADD NEW USER button in Settings & Users tab is being used.

Figure 11: Add new user

After clicking ADD NEW USER button, New Account page is being shown, where new account information should be entered. *Note:* All fields are required!

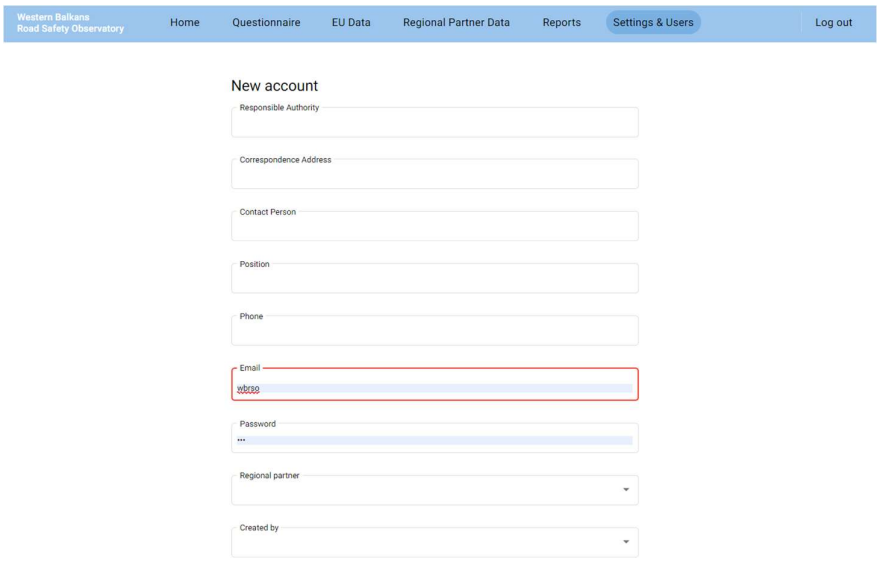

Figure 12: New Account

5.2 Adding new questionnaire

To add new reports simply go to the Questionnaire tab of the navigation banner. There you'll see a button with ADD NEW QUESTIONNAIRE title.

Figure 13: Add new questionnaire

After clicking the ADD NEW QUESTIONNAIRE button it is required to select year for which the data will be entered.

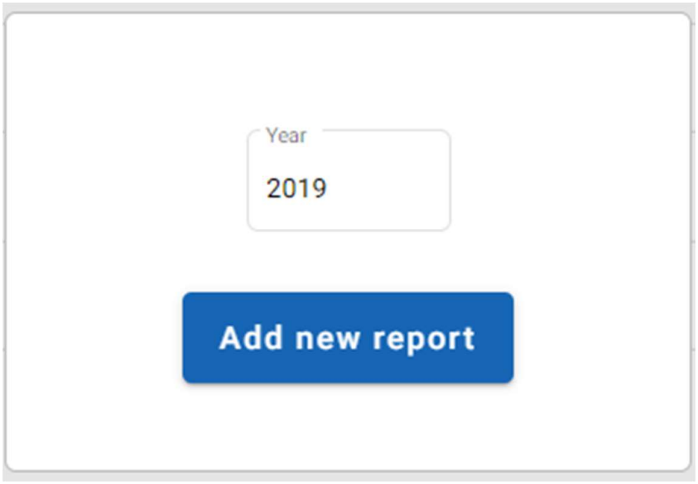

Figure 14: Add new report

When account which belongs to Regional Coordinator category of the user is used, all sections of the questionnaires are displayed. For other categories of the users from different sectors (police, traffic, health), a subset of these questions will be displayed.

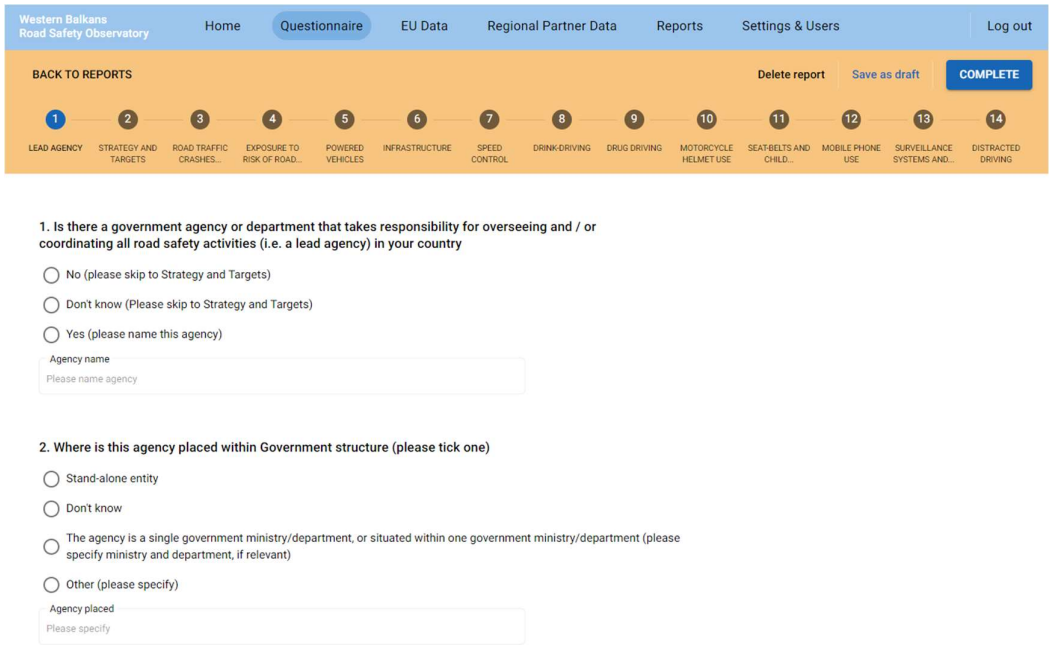

Figure 15: Questionnaires

If all required fields are not filled in with data, the report can not be completed and the user will be taken to the question that needs data entry, as shown on the next picture.

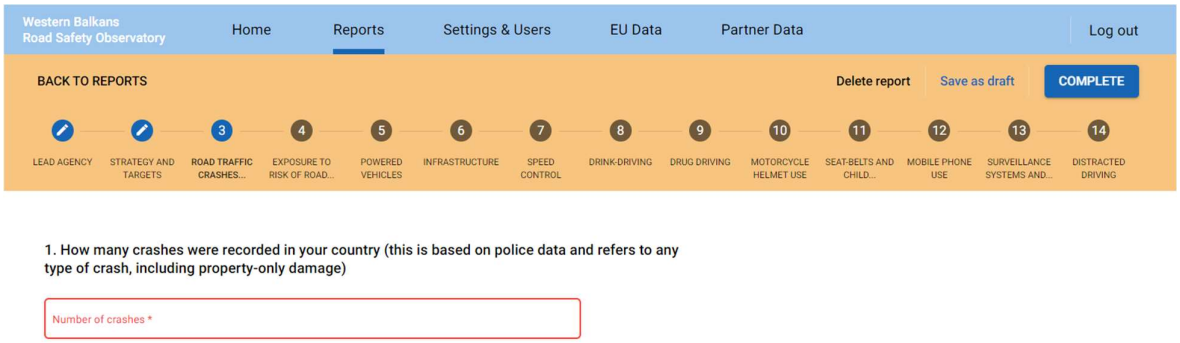

Figure 16: Missing field indicator

For each user role different questionnaire will be displayed. Each Sector Representative must click the COMPLETE button after inputting data. This step is necessary for the Regional Coordinator to able to click final COMPLETE button for the questionnaire to be finished.

Sector Representative's input status can be seen on table below. When Sector Representative completes their part of the questionnaire status will change from red x to green checked sign.

2021	CREATED	Albania	✗	✗	✗
2021	CREATED	Montenegro	✗	✗	✗
2021	CREATED	North Macedonia	✗	✗	✗
2021	CREATED	Bosnia and Herzegovina	✗	✗	✗
2021	CREATED	Kosovo	✗	✗	✗
2020	CREATED	Albania	✗	✗	✗
2020	CREATED	Bosnia and Herzegovina	✗	✗	✗
2020	CREATED	Kosovo	✗	✗	✗
2020	IN PROGRES	Serbia	✗	✗	✓
2020	IN PROGRES	Montenegro	✓	✓	✓
2020	IN PROGRES	North Macedonia	✓	✗	✗
2019	CREATED	Albania	✗	✗	✗
2019	CREATED	Montenegro	✗	✗	✗
2019	CREATED	Kosovo	✗	✗	✗
2019	CREATED	Bosnia and Herzegovina	✗	✗	✗
2019	CREATED	North Macedonia	✗	✗	✗
2019	IN PROGRES	Serbia	✗	✗	✓

Figure 17: Status changed

First column stands for year of the questionnaire, second column is for status of the whole questionnaire, third for the regional partner and then columns for the specific sector sections of the questionnaire statuses.

WBRSO mobile application

5.3 Using mobile application

Mobile application does not require log in, as no data entering is planned. Only review of the data being stored in WBRSO database and corresponding reports is allowed.

Figure 18: Home page

5.4 Options

At the bottom, you can see tabs for different views of the application. You have to select the desired tab to view desired information.

5.4.1 Regional partners

To see Regional Partner information, you have to select Partners tab.

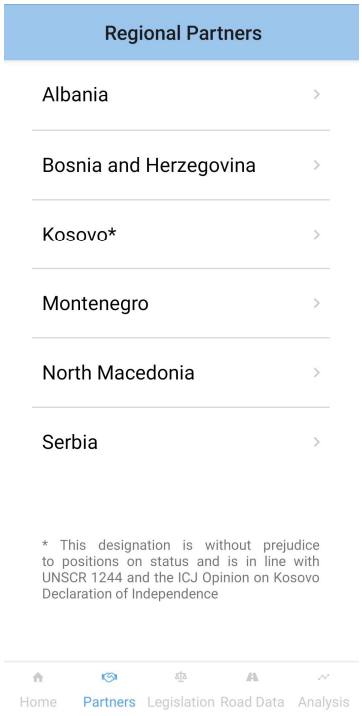

Figure 19: Regional Partners

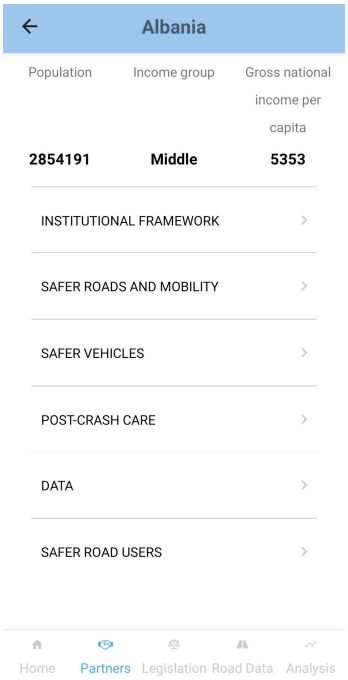

Figure 20: Regional Partner information

If you select a different category a dropdown list will reveal information for that segment.

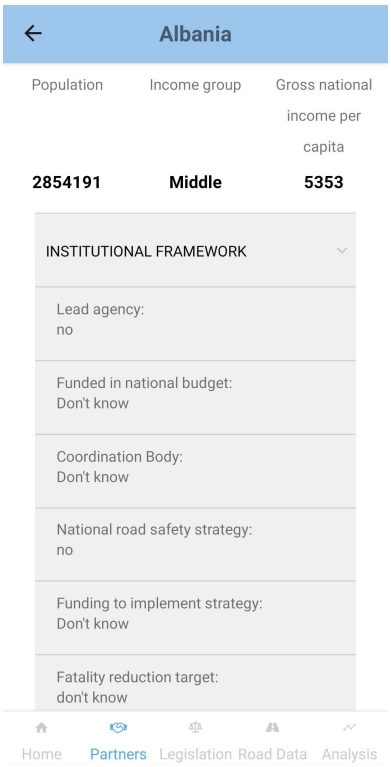

Figure 21: Dropdown data

5.4.2 Legislation

The next tab is Legislation, where you have legislation for all Regional Partners.

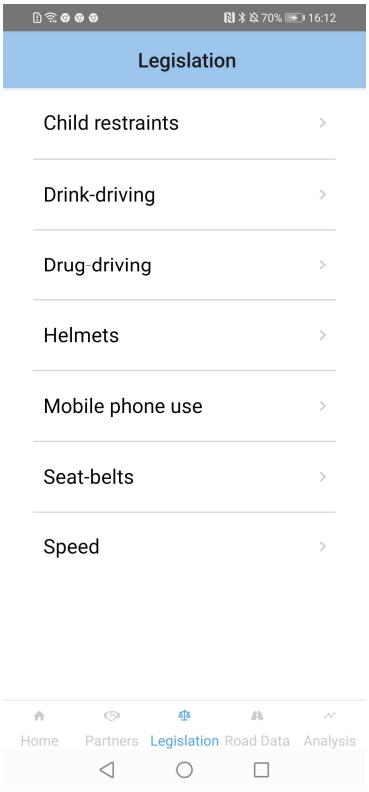

Figure 22: All Regional Partners legislations

When selecting a Legislation tab, a search box will appear with dropdown options per risk factor.

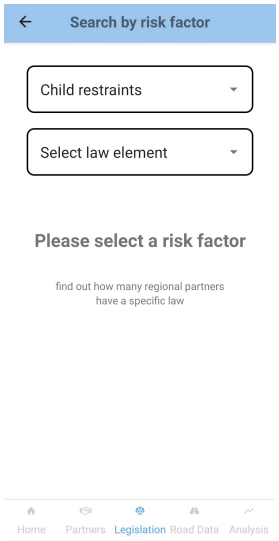

Figure 23: Chosen legislation factors

Selecting the desired factor will show the information for all Regional partners.

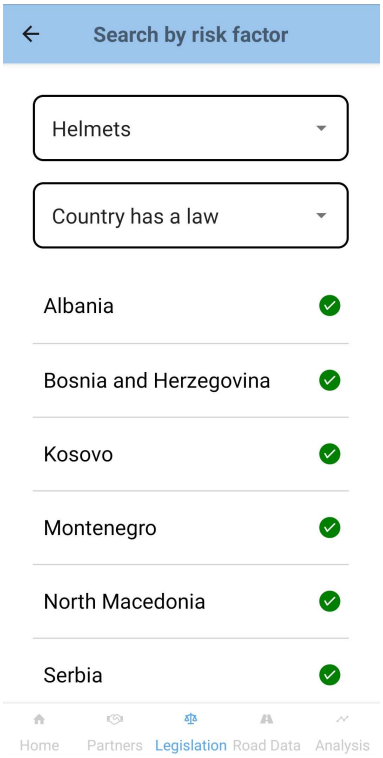

Figure 24: Legislation factors for all Regional partners

5.4.3 Road Safety Data

In the Road Safety Data part, the area for which you wish to see the data must be selected.

5.4.3.1 Regional Partner area

For the Regional Partner area, you have to select the regional partner, year, and category.

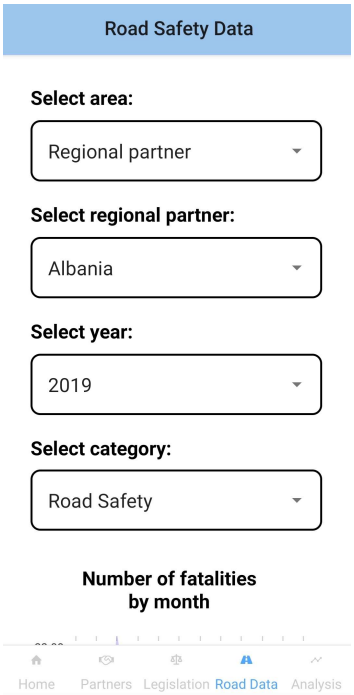

Figure 25: Example of road safety data screen

Here are examples of some of the graphs.

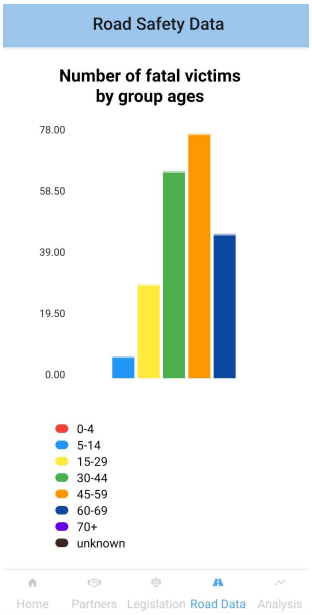

Figure 26: Example of graphs

When you select the year of the reports and category, various available graphs will be shown from the following categories

For **Safer Roads and Roadsides**:

- Road Safety
- Safer Roads and Roadsides
- Safer Speeds
- Safer Vehicles
- Safer Road Users
- Post-Crash Care

For **Road Safety**:

- Number of fatalities by month
- Number of fatal crashes by hour of the day
- Number of fatal victims by group ages
- Number of fatal victims by gender
- Number of fatal victims by weather conditions
- Number of fatal victims by type of road users
- Institutional framework

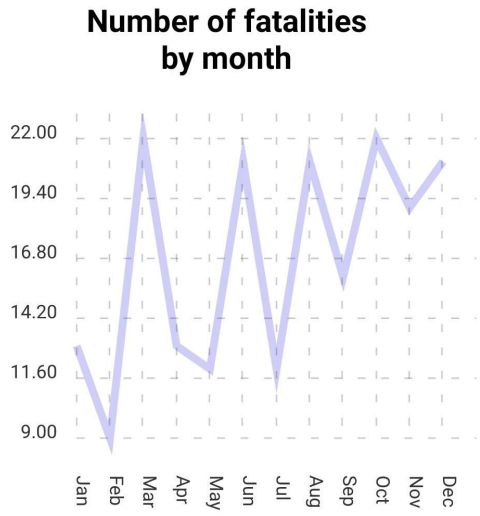

Figure 27: Number of fatalities by month

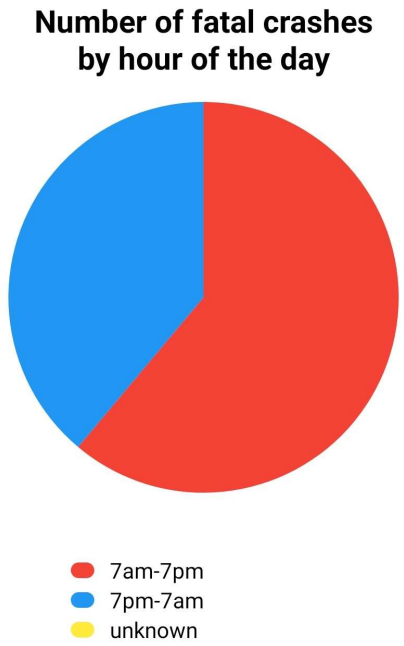

Figure 28: Number of fatal crashes by hour of the day

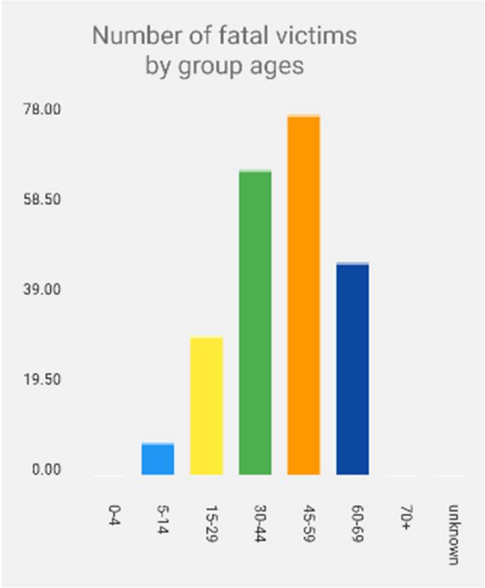

Figure 29: Number of fatal victims by group ages

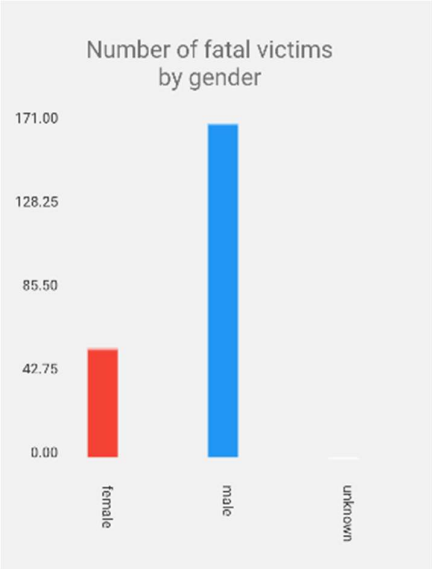

Figure 30: Number of fatal victims by gender

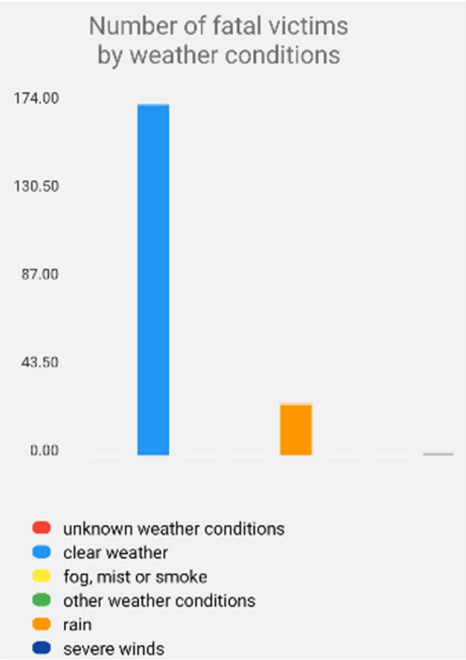

Figure 31: Number of fatal victims by weather conditions

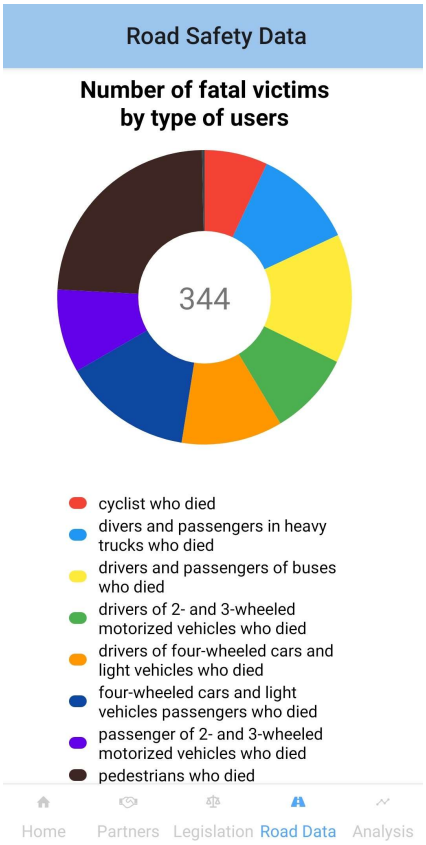

Figure 32: Number of fatal victims by type of road users

Figure 33: Institutional framework

For **Safer Roads and Roadsides**:

- Type of road
- Number of different road traffic crashes
- Number of fatal crashes by type of junction
- Junction management

- Safer roads and mobility

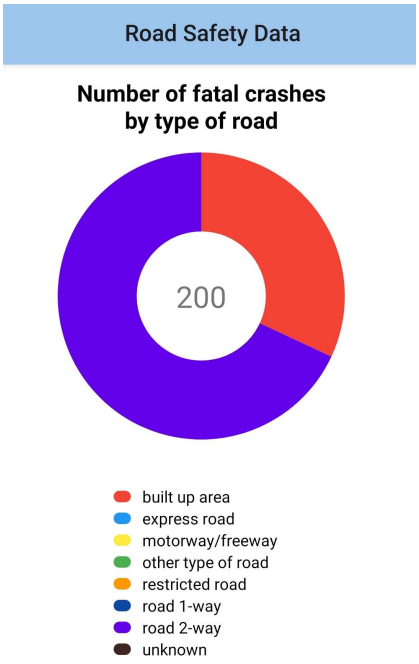

Figure 34: Type of road

Number of different road traffic crashes

Category	Number
Road traffic crashes with non-fatal injury or a death	25542
Road traffic slightly injured victims	23448
Road traffic seriously injured victims	4633
Road traffic deaths	1039

Figure 35: Number of different road traffic crashes

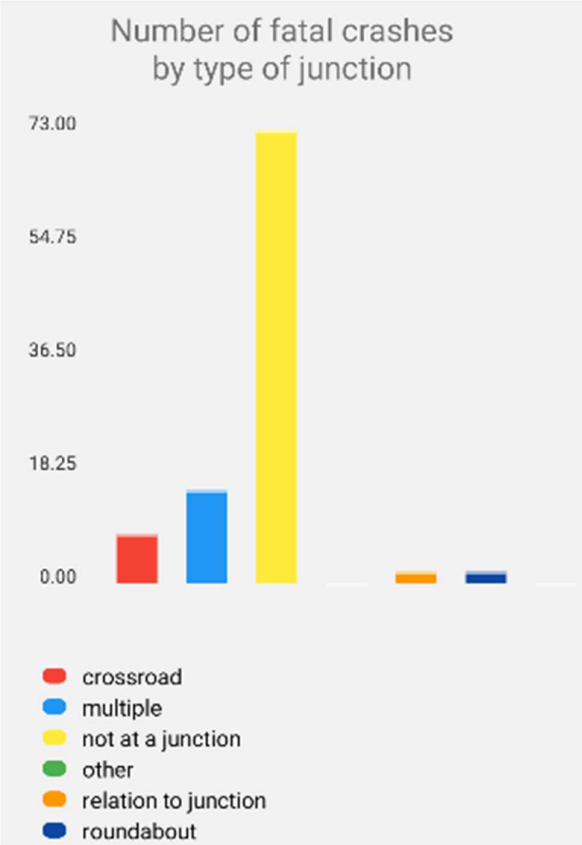

Figure 36: Junctions

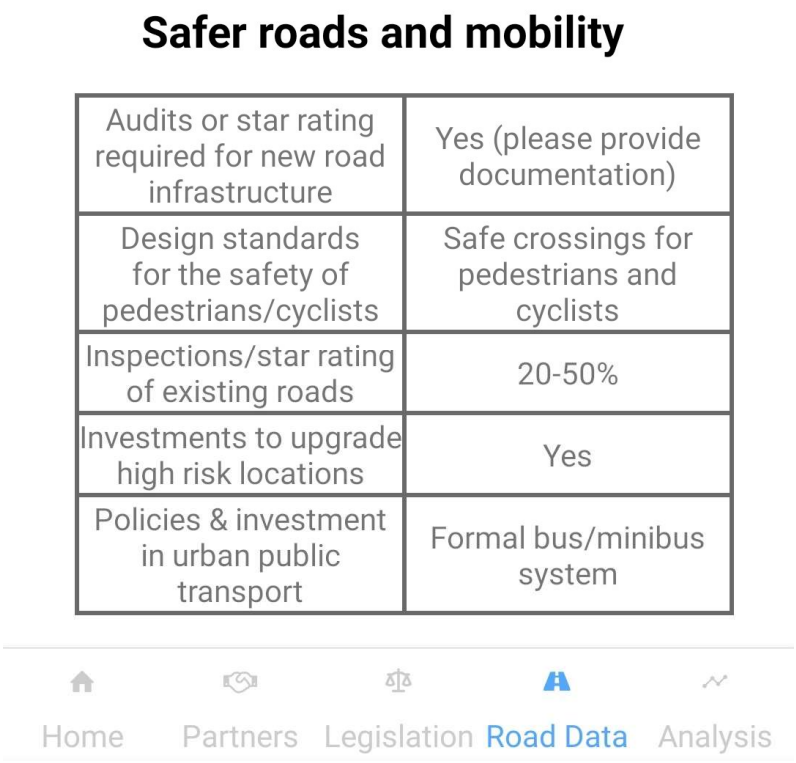

Figure 37: Safer roads and mobility

For **Safer Speeds**:

- Number of fatal crashes by road speed limit
- Speed limits

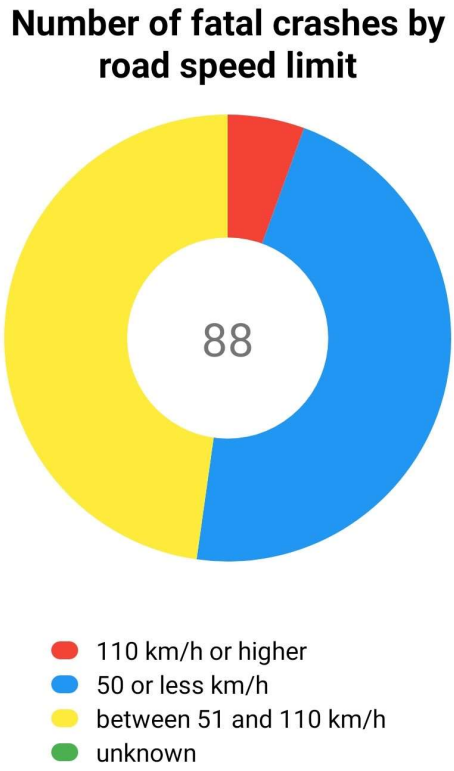

Figure 38: Number of fatal crashes by road speed limit

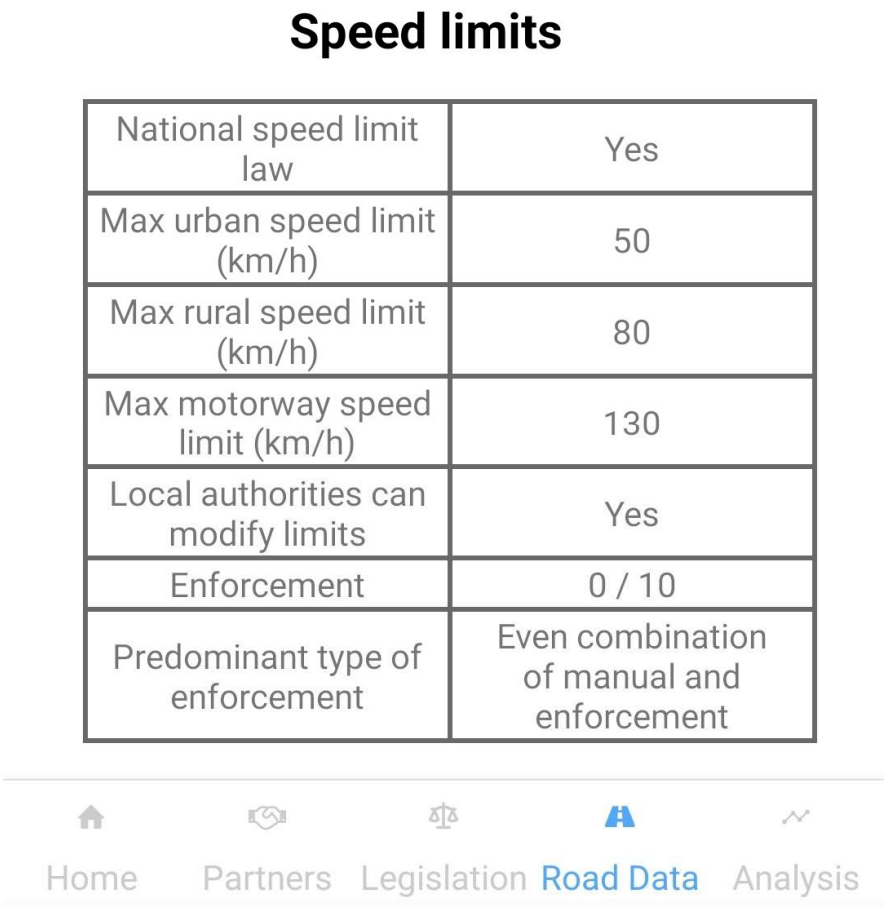

Figure 39: Speed limits

For **Safer Vehicles**:

- Safer Vehicles

Figure 40: Safer vehicles

For **Safer Road Users**, there are:

- Helmet wearing among users of motorized two-wheelers
- Seat-belt wearing rates
- Drink-driving
- Motorcycle helmet
- Seat-belt
- Child restraint
- Mobile phone
- Drug-driving

Helmet wearing among users of motorized two-wheelers

Motorized two-wheelers user type	Percentage
All riders	75.23
Drivers	82.63
Passengers	55.36

Figure 41: Helmet wearing among users of motorized two-wheelers

Seat-belt wearing rates

Occupant type	Percentage
Drivers	87.63
FRONT seat occupants	82.36
REAR seat occupants	20.36
ALL occupants	25.69

Figure 42: Seat-belt wearing rates

Drink-driving

National drink-driving law	Yes
BAC limit – general population	<0.02g/dl
BAC limit – young or novice drivers	Zero
Random breath testing carried out	All year random (population) breath testing
Testing carried out in case of fatal crash	Some (not all drivers are tested)
Enforcement	8 / 10
% road traffic deaths involving alcohol	Don't know

Figure 43: Drink-driving

Motorcycle helmet

National motorcycle helmet law	Yes
Applies to drivers and passengers	Yes
Enforcement	7 / 10

Seat-belt

National seat-belt law	Yes
Applies to front and rear seat occupants	Yes
Enforcement	6 / 10

Child restraint

National child restraint law	Yes
Enforcement	6 / 10
% children using child restraints	48.7

Figure 44: Motorcycle helmet; Seat-belt; Child restraint;

Mobile phone

National law on mobile phone use while driving	Yes
Ban on hand-held mobile phone use	Yes
Ban on hands-free mobile phone use	Yes

Drug-driving

National drug-driving law	Yes

Figure 45: Mobile phone; Drug-driving;

For **Post-Crash Care**:

- Methods for measuring the rapidity of post-crash care

Post-crash care

Vital registration/death certification system	Yes
Trauma registry	Some scattered facilities
National emergency care access numbe	/
Formal certification for prehospital providers	Yes
National assessment of emergency care systems	Yes

Figure 46: Post-crash care

5.4.3.2 Western Balkans area

When you select the Western Balkans area and the year, the map of road fatalities in the Western Balkans will be shown.

Figure 47: Map of road fatalities per million inhabitants in Western Balkans

And also a graph for the number of fatal victims by type of road users.

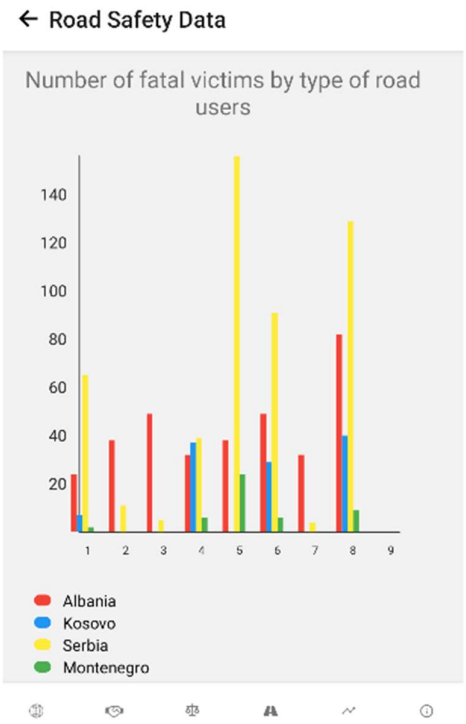

Figure 48: Number of fatal victims by type of road users

Here you can see comparison between all regional partners.

- Map of road fatalities per million inhabitants in Western Balkans
- Number of fatal victims by group age
- Number of fatal victims by gender
- Number of fatal crashes by weather conditions
- Number of fatal victims by type of road users
- Number of fatal crashes by type of road
- Number of fatal crashes by type of junction
- Number of fatal crashes by road speed limit
- Number of fatal crashes by hour of the day
- Number of different road traffic crashes

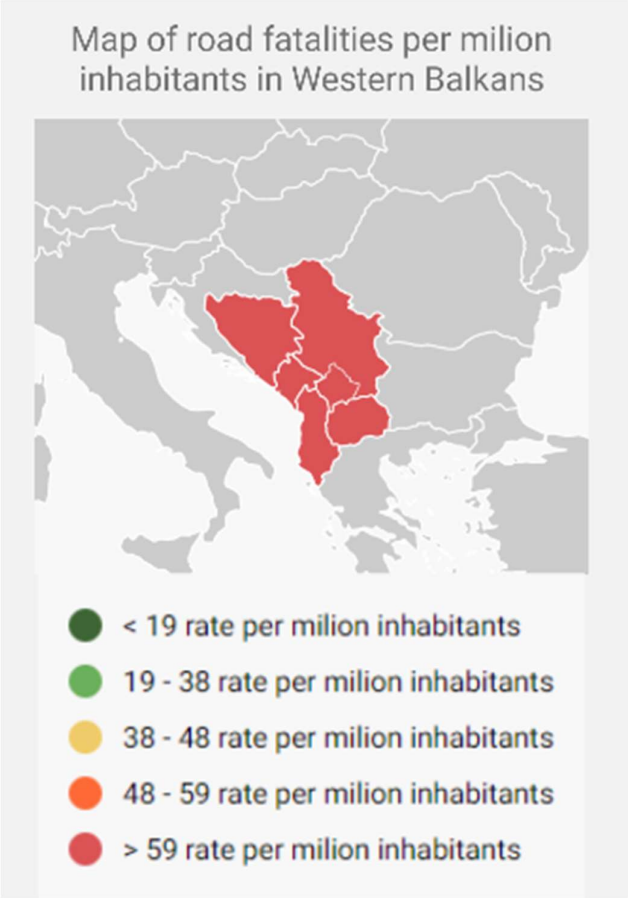

Figure 49: Map of Western Balkans

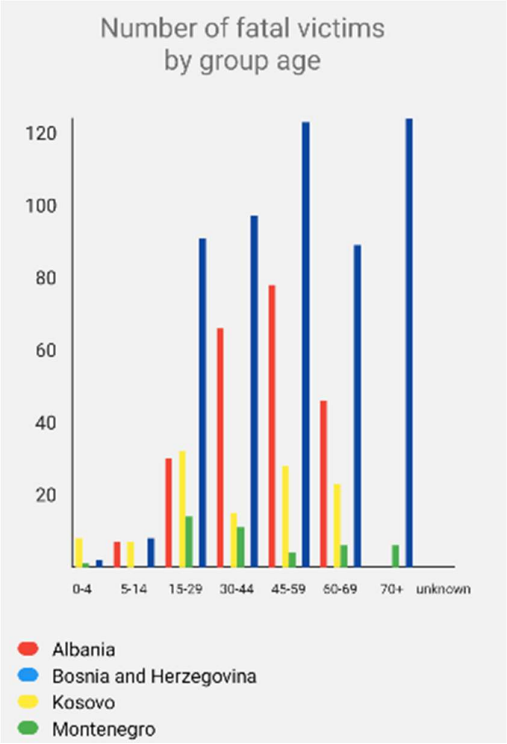

Figure 50: Number of fatal victims by group age

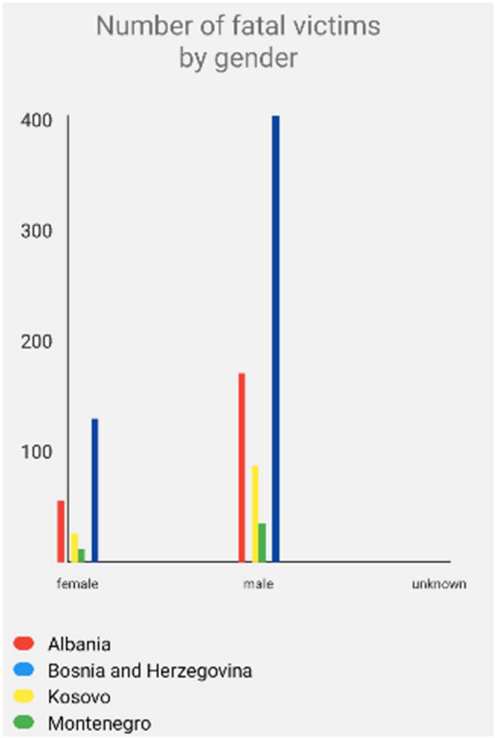

Figure 51: Number of fatal victims by gender

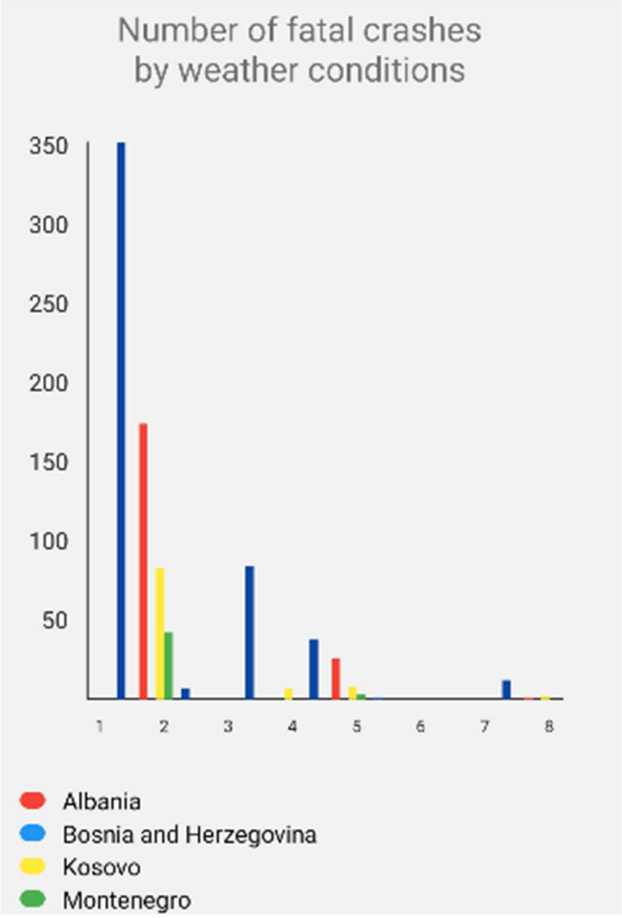

Figure 52: Number of fatal crashes by weather conditions

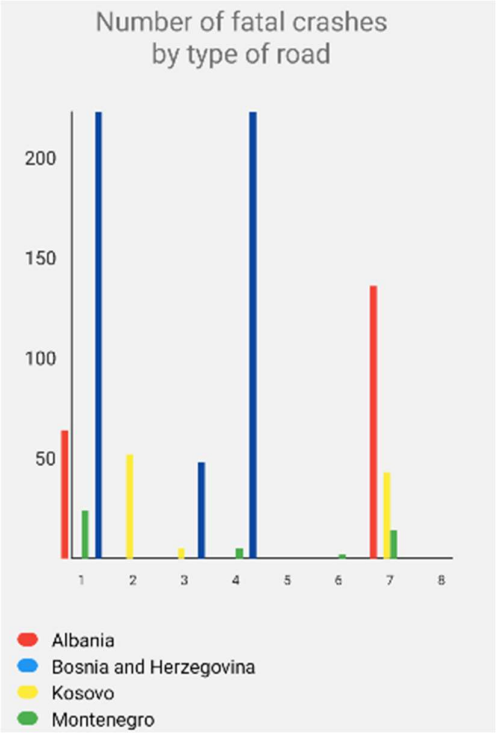

Figure 53: Number of fatal victims by type of road

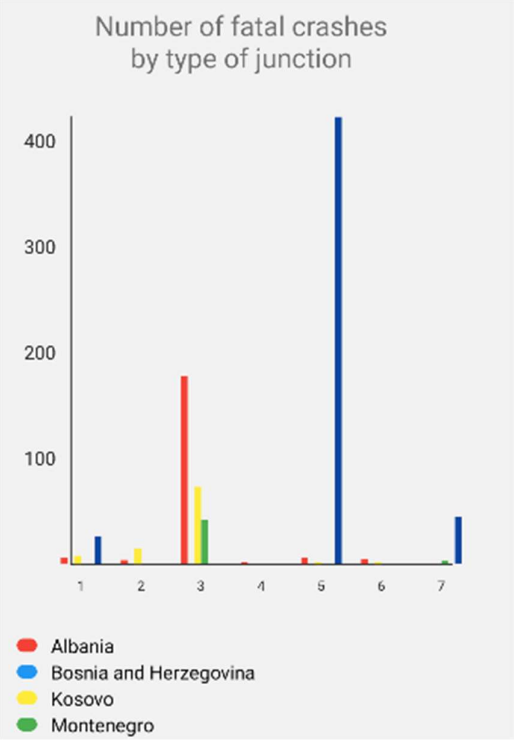

Figure 54: Number of fatal crashes by type of junction

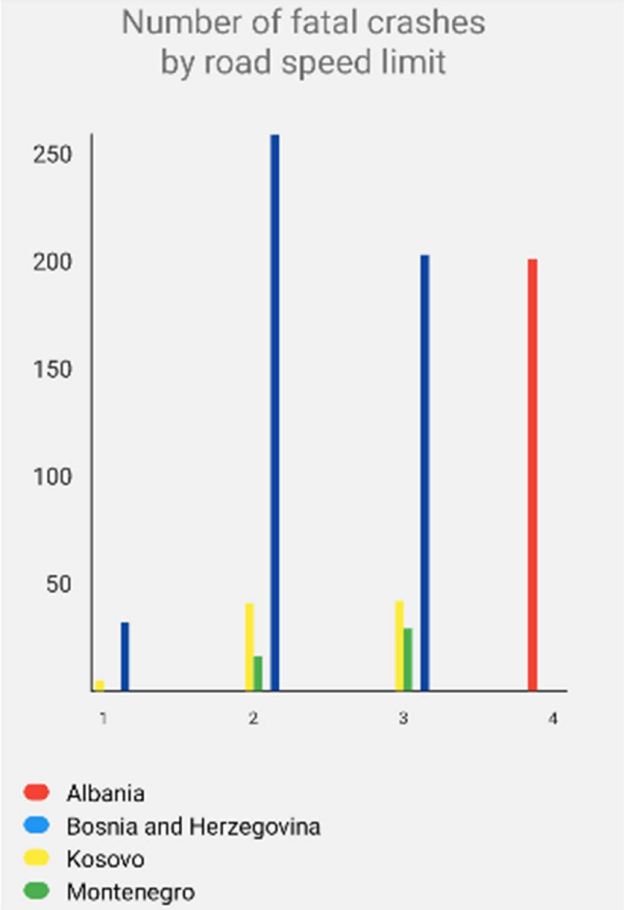

Figure 55: Number of fatal crashes by road speed limit

Number of fatal crashes by hour of the day

	7AM-7PM	7PM-7AM	Unknown
North Macedonia	0	0	0
Montenegro	15	29	1
Bosnia and Herzegovina	0	0	0
Serbia	221	313	0
Albania	78	123	0
Kosovo	43	57	0

Figure 56: Number of fatal crashes by hour of the day

Number of different road traffic crashes

Category	Number
Road traffic crashes with non-fatal injury or a death	25542
Road traffic slightly injured victims	23448
Road traffic seriously injured victims	4633
Road traffic deaths	1039

Figure 57: Number of different road traffic crashes

5.4.3.3 Western Balkans and EU area

Here you can see the map of the EU with the Western Balkans area which is colour coded by the legend information below the map.

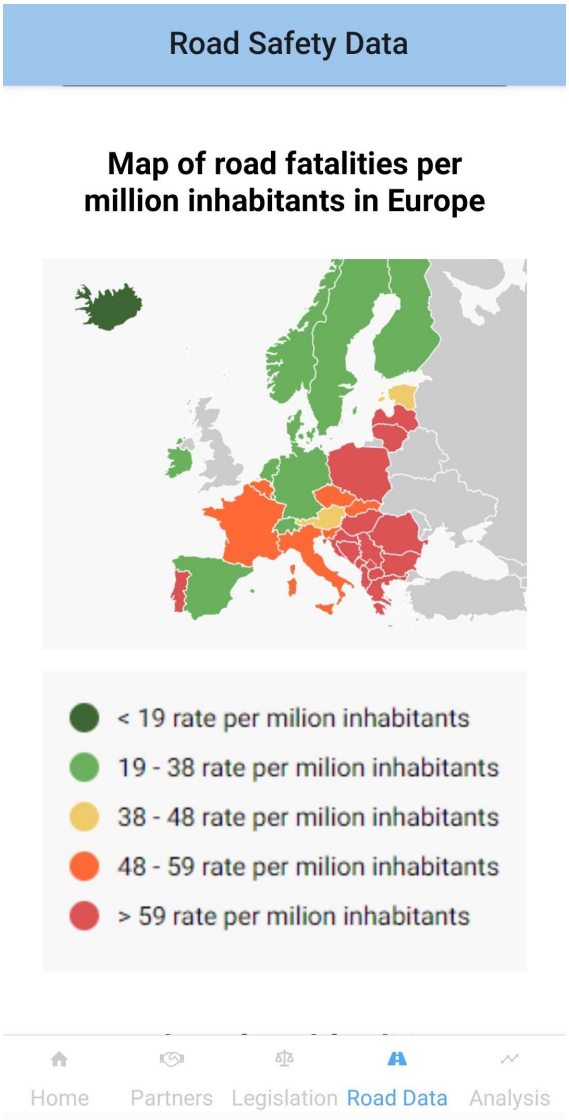

Figure 58: Colour-coded map of EU and Western Balkans

Also, you can see the number of fatalities per 100.000 inhabitants in the Western Balkans. The green horizontal line represents the average in the EU27 and the red line represents the average for the Western Balkans regional partners.

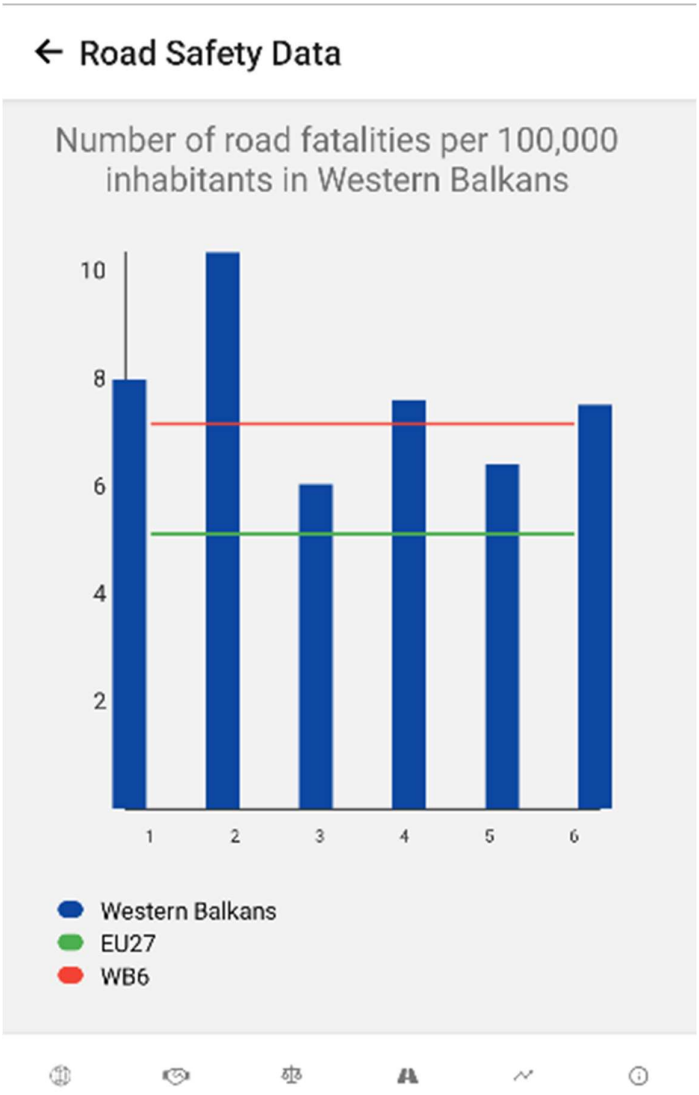

Figure 59: Number of fatalities per 100.000 inhabitants in Western Balkans

And lastly, on this page, you can see a horizontal bar chart that represents the number of deaths per million inhabitants in comparison with the EU and Western Balkans which are represented in a different colour.

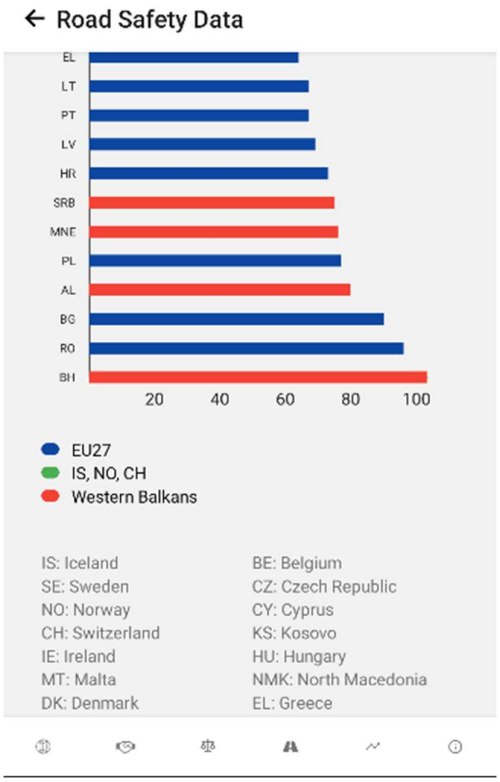

Figure 60: Number of road fatalities per million inhabitants – EU

5.4.4 Trend analysis

The last tab Analysis represents trend analysis.

Here we have:

- Trends in reported road traffic deaths
- Downward trend in the number of road traffic fatalities
- Annual number of fatalities by Regional Partner (2010 – 2014)
- Annual number of fatalities by Regional Partner (2015 – 2019)
- Facts and figures about Western Balkans

Figure 61: Trends in reported road traffic deaths

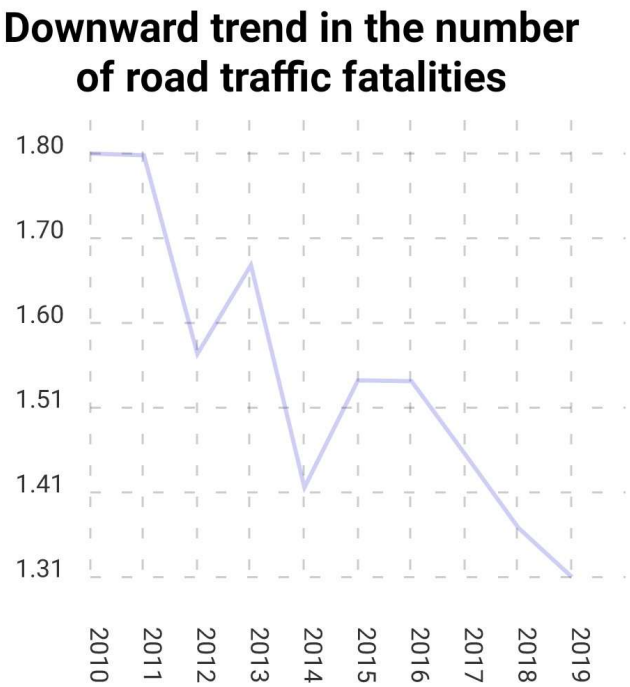

Figure 62: Downward trend in the number of road traffic fatalities

Trend Analysis

Annual number of fatalities by Regional Partner (2010 – 2014)

Regional Partner	2010	2011	2012	2013	2014
Albania	352	322	284	295	264
Bosnia and Herzegovina	355	356	299	334	297
Kosovo	175	157	121	119	127
Montenegro	95	58	46	74	65
North Macedonia	162	172	132	198	130
Serbia	660	731	688	650	536
Western Balkans	1796	1794	1568	1669	1416

Figure 63: Annual number of fatalities by Regional Partner (2010 - 2014)

Figure 64: Annual number of fatalities by Regional Partner (2015 - 2019)

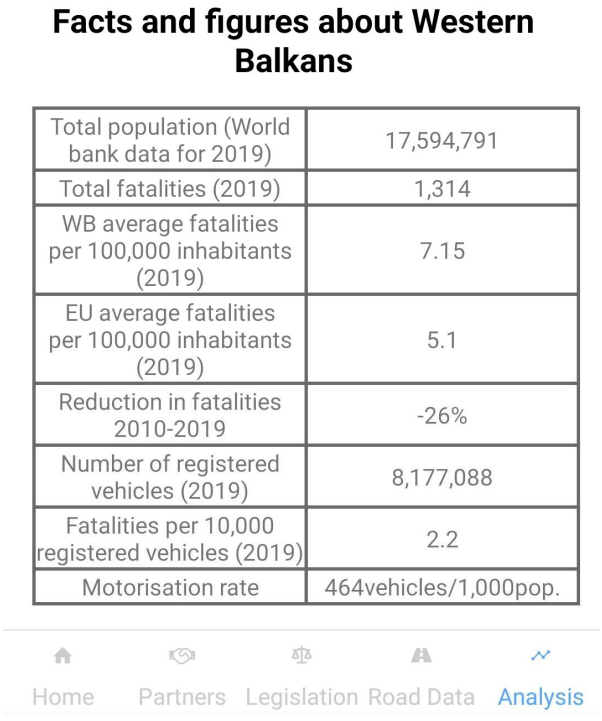

Figure 65: Facts and figures about Western Balkans

5.4.5 About

About is available on the home page when you click the Read more link, and it contains the information about the application, a link to the contact and introduction as well as the copyright info and the version of the application.

Figure 66: About

6 Training

6.1 Logging in

For Administrators and RP's user, log in is required. *Sign in* button on the top right side of the page will be used

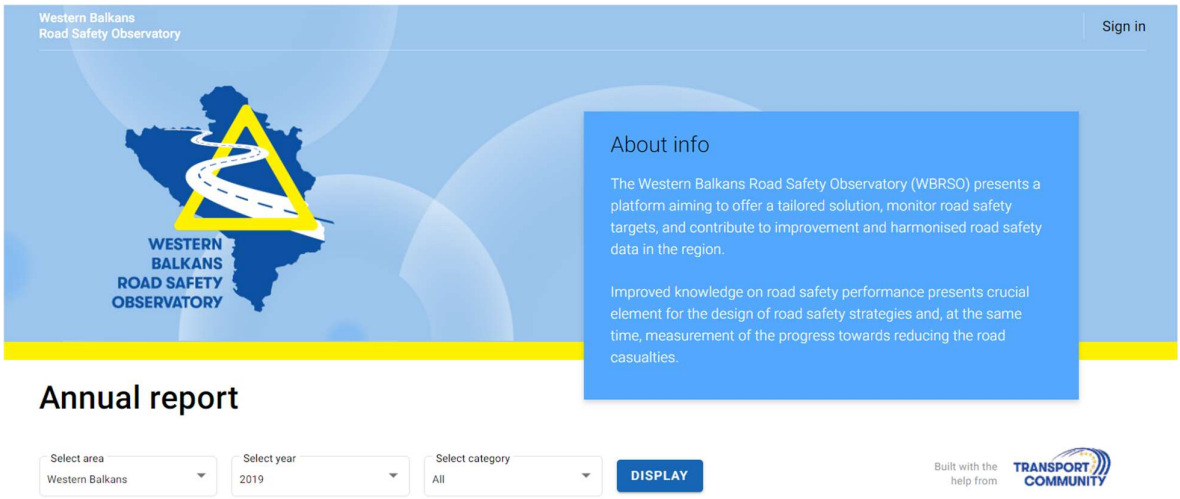

Figure 67: Home page

A popup will appear asking for credentials: email and password.

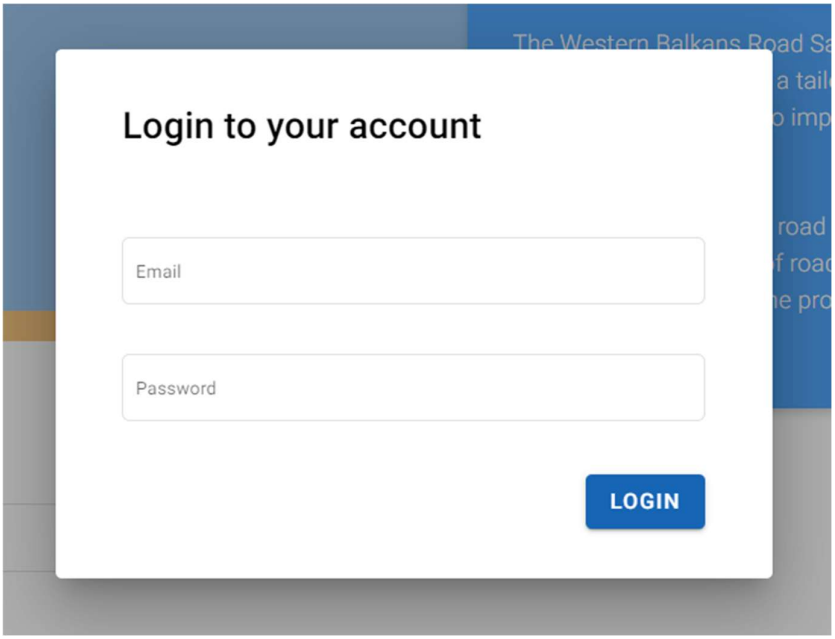

Figure 68: Login popup

For the wrong email or password, the error message will appear at the bottom of the screen.

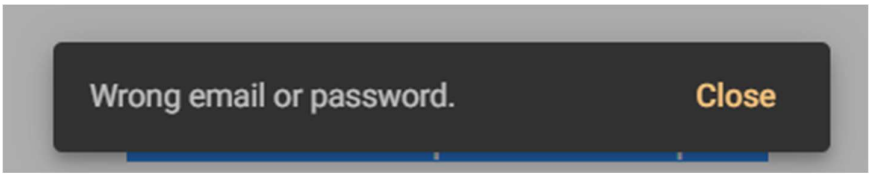

Figure 69: Error message

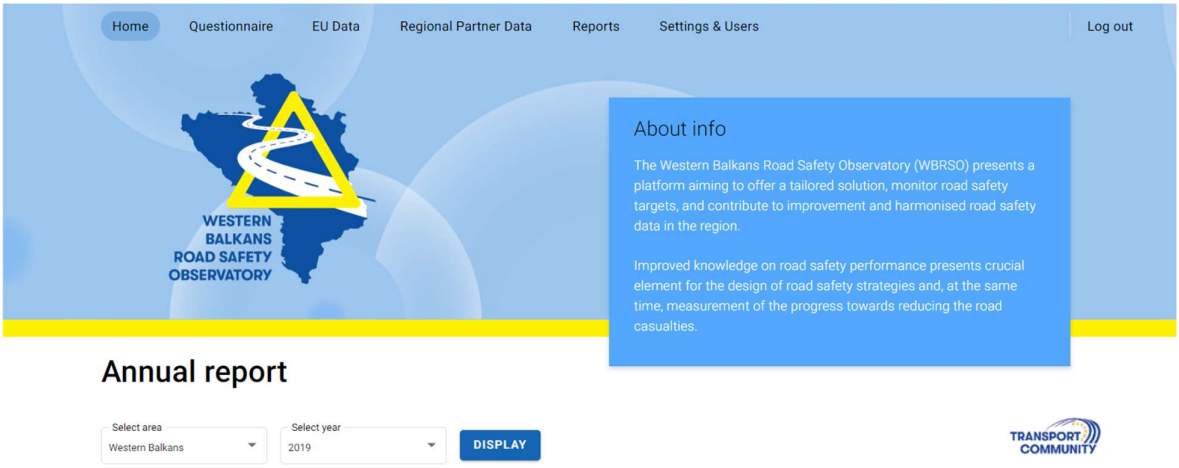

Figure 70: Home page after login

6.2 Adding new user

To add a new user, ADD NEW USER button in Settings & Users tab is being used.

Figure 71: Add new user

After clicking ADD NEW USER button, New Account page is being shown, where new account information should be entered. *Note:* All fields are required!

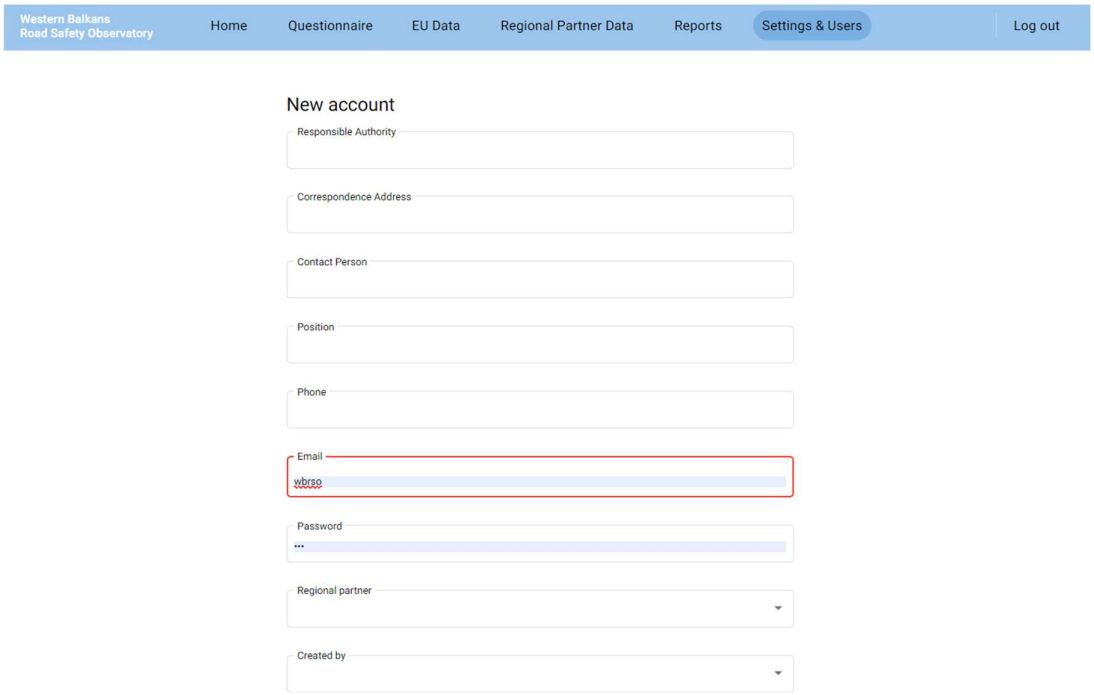

Figure 72: New account

6.3 Adding new questionnaire

To add new questionnaire simply go to the Questionnaire tab of the navigation banner. There you'll see a button with ADD NEW QUESTIONNAIRE title.

Figure 73: Add new questionnaire button

After clicking the ADD NEW REPORT button it is required to select year for which the data will be entered.

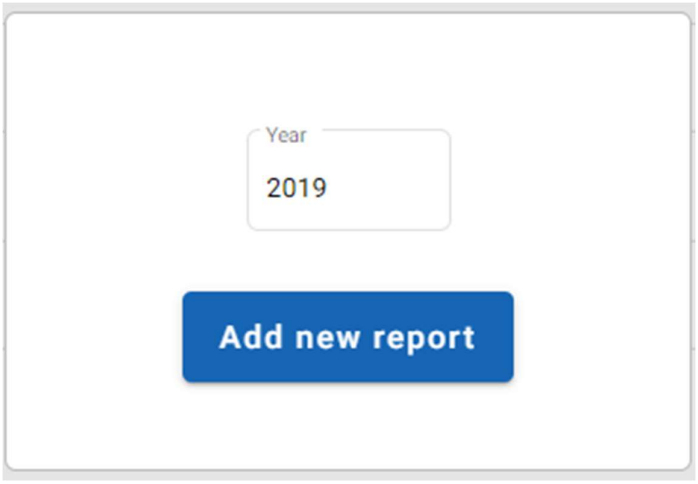

Figure 74: Add new report

When account which belongs to Regional Coordinator category of the user is used, all sections of the questionnaires are displayed. For other categories of the users from different sectors (police, traffic, health), a subset of these questions will be displayed.

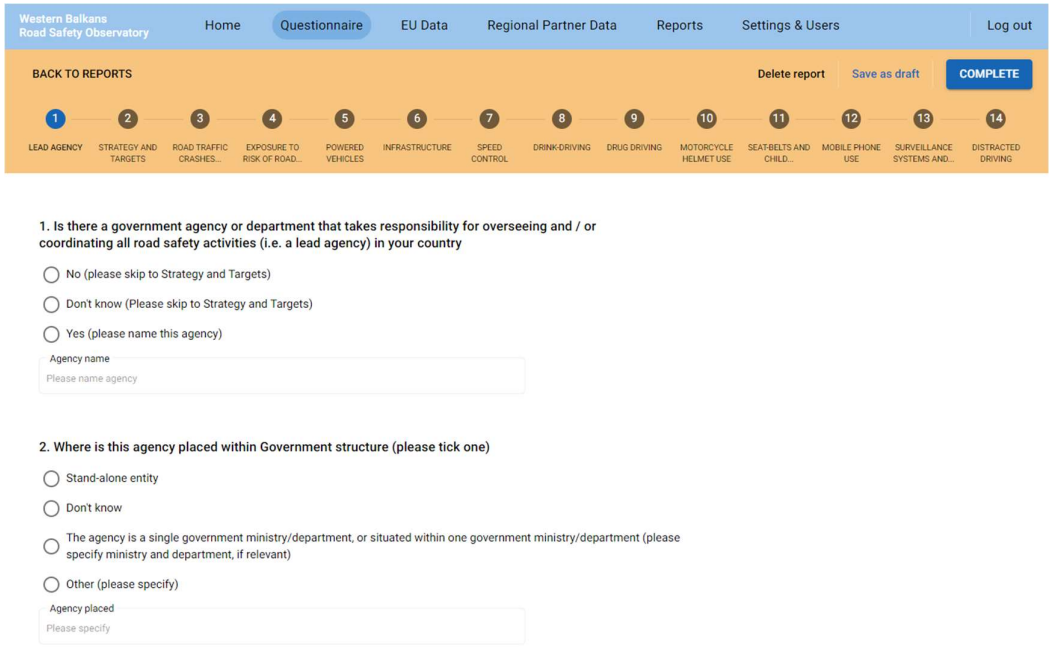

Figure 75: Input data fields

If all required fields are not filled in with data, the report cannot be completed and the user will be taken to the question that needs data entry, as shown on the next picture.

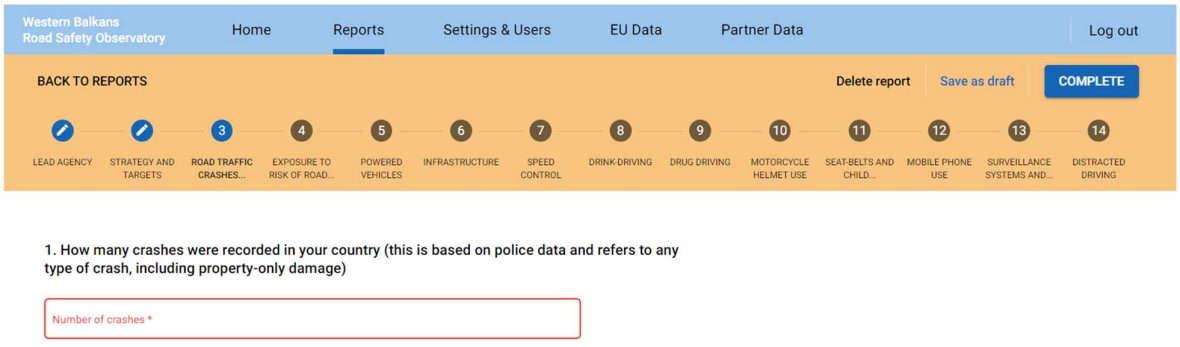

Figure 76: Missing field indicator

When you log in as a Police sector representative you will see a set of questionnaires that are designated for your sector to fill in.

Designated questionnaire sections are: 3, 4, 5, 7, 8, 9, 10, 11, 12, and 14

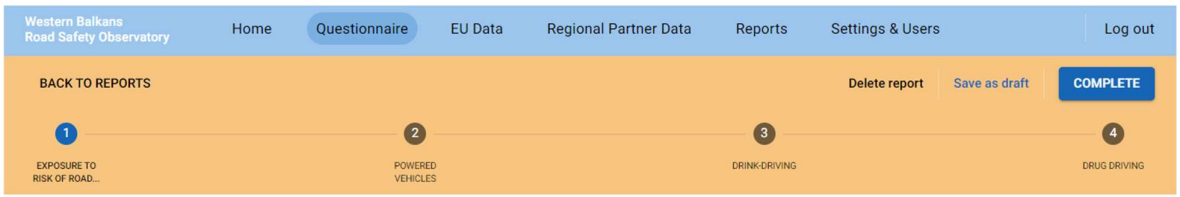

Figure 77: Logged in as police sector

When you log in as a Health sector representative you will see a set of questionnaires that are designated for your sector to fill in.

Designated questionnaire sections are: 13

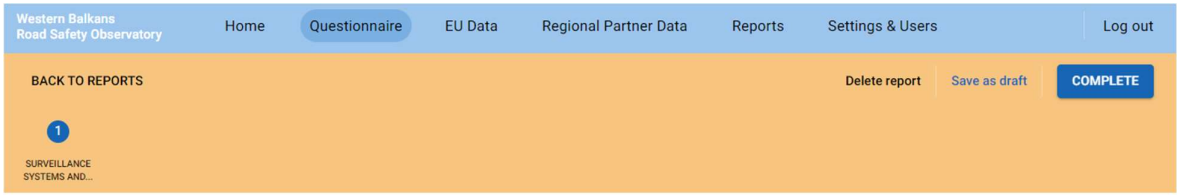

Figure 78: Logged in as health sector

When you log in as a Transport sector representative you will see a set of questionnaires that are designated for your sector to fill in.

Designated questionnaire sections are 1, 2, and 6.

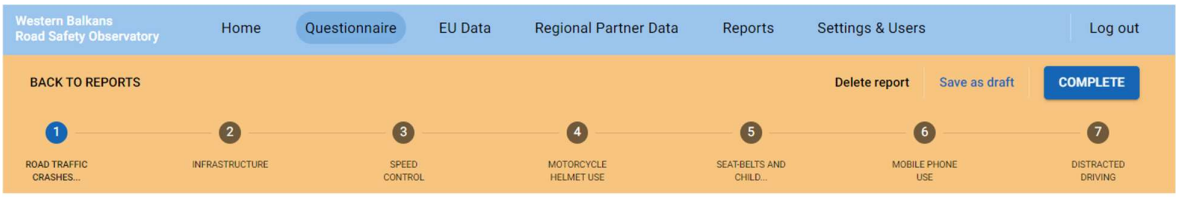

Figure 79: Logged in as transport sector

Users from Health and Police can see also other sections of questionnaires but can edit just the above sections. Regional Coordinators (Transport) see and edit all sections of the questionnaires.

For each user role different questionnaire will be displayed. Each Sector Representative must click the COMPLETE button after inputting data. This step is necessary for the Regional Coordinator to able to click final COMPLETE button for the questionnaire to be finished.

Sector Representative's input status can be seen on table below. When Sector Representative completes their part of the questionnaire status will change from red x to green checked sign.

2021	CREATED	Albania	✗	✗	✗
2021	CREATED	Montenegro	✗	✗	✗
2021	CREATED	North Macedonia	✗	✗	✗
2021	CREATED	Bosnia and Herzegovina	✗	✗	✗
2021	CREATED	Kosovo	✗	✗	✗
2020	CREATED	Albania	✗	✗	✗
2020	CREATED	Bosnia and Herzegovina	✗	✗	✗
2020	CREATED	Kosovo	✗	✗	✗
2020	IN PROGRES	Serbia	✗	✗	✓
2020	IN PROGRES	Montenegro	✓	✓	✓
2020	IN PROGRES	North Macedonia	✓	✗	✗
2019	CREATED	Albania	✗	✗	✗
2019	CREATED	Montenegro	✗	✗	✗
2019	CREATED	Kosovo	✗	✗	✗
2019	CREATED	Bosnia and Herzegovina	✗	✗	✗
2019	CREATED	North Macedonia	✗	✗	✗
2019	IN PROGRES	Serbia	✗	✗	✓

Figure 80: Status change

6.4 Using mobile application

Mobile application does not require log in, as no data entering is planned. Only review of the data being stored in WBRSO database and corresponding reports is allowed.

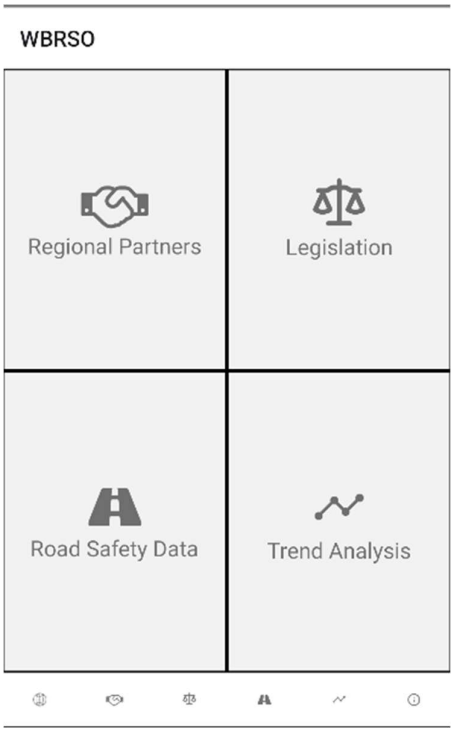

Figure 81: Home page

6.5 Options

By scrolling through mobile application, various of choices of dropdown menus and charts is presented, based on users selection.

First option offered is to select area between Regional partner, Western Balkans and EU + Western Balkans.

Regional partner area

When you select year of the reports and category, you'll be shown various graphs.

Categories for safer roads and roadsides are:

- Road Safety
- Safer Roads and Roadsides
- Safer Speeds
- Safer Vehicles
- Safer Road Users
- Post-Crash Care

For **Road Safety** we have graphs for:

- Number of fatalities by month
- Number of fatal crashes by hour of the day
- Number of fatal victims by group ages
- Number of fatal victims by gender
- Number of fatal victims by weather conditions
- Number of fatal victims by type of road users
- Institutional framework

For **Safer Roads and Roadsides** there are:

- Number of fatal crashes by type of road
- Number of different road traffic crashes
- Number of fatal crashes by type of junction
- Safer roads and mobility

For **Safer Speeds** there are:

- Number of fatal crashes by road speed limit
- Speed limits

For **Safer Vehicles** there are:

- Safer vehicles

For **Safer Road Users**, there are:

- Helmet wearing among users of motorized two-wheelers
- Seat-belt wearing rates
- Drink-driving
- Motorcycle helmet
- Seat-belt
- Child restraint
- Mobile phone
- Drug-driving

For **Post-Crash Care**, there are:

- Post-crash care

Western Balkans area

If you have chosen Western Balkans area, you'll have to choose year of the reports.

EU + Western Balkans area

If you have chosen EU + Western Balkans area, you'll have to choose year of the questionnaires.

6.6 Training sessions

The training sessions have been performed for all RPs:

- Bosnia and Herzegovina - on 23.11.2022.
- Serbia - on 23.11.2022.

- Albania - on 24.11.2022.
- Kosovo - on 25.11.2022.
- Montenegro - on 25.11.2022.
- North Macedonia - on 29.11.2022.

7 System Maintenance Plan

During the maintenance period the Contractor will produce maintenance reports every two months, presenting a summary of activities undertaken within such period.

Standard maintenance activities include:

- Monitoring system performance, operations and use of information systems
- Ensuring regular backups
- General support - software updates, operating systems patches, updates of security certificates, etc
- Fixing errors (response and resolution time of 1 working day for critical issues and 3 working days for non-critical issues)
- Documenting changes being made
- Recommendations for software and hardware upgrades.

As it was not possible to conduct full data entry process for the previous years during system testing and training, it is expected that in the process of entering the data for the year 2022. some suggestion for system changes are received as a feedback from the WBRSO users. Those comments will be analysed and minor changes which are improving data presentation/reporting will be implemented during maintenance period.

Finally, during the maintenance phase and at least 2 months before the end of the contract, the hosting within TCT must be defined and system installed and integrated with TODIS platform.

8 Concluding remarks and the next steps

The publication of this Phase 2 Report effectively concludes the Development of Information System phase of the assignment *Design, implementation and maintenance of the Information System for the Western Balkans Road Safety Observatory (WBRSO)*.

The next project phase is WBRSO Taking Over, which should result in the next project deliverable – Taking Over protocol, which is expected to be completed by the end of 10th project month – December 4th.

WBRSO Information System shall be taken over by the Contracting Authority when:

- the Contractor has successfully carried out all tests provided by the Acceptance Testing Plan, all test reports for the system being accepted by the Contracting Authority;
- WBRSO system documentation (Phase 2 reports) has been submitted and approved unconditionally by the Contracting Authority;
- the Contractor has successfully delivered the training sessions.