



## **WP3. Teaching materials development related to the road infrastructure safety inspection**

### **IO.6 - Practical implementation of RSI methodology on the selected road sections in Poland**

This project has been funded with the support of the European Commission. This publication reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Copyrights



## List of authors:

### Gdansk University of Technology

Wojciech Kustra, Marcin Budzynski, Joanna Wachnicka, Tomasz Mackun

### Bauhaus-Universität Weimar

Julius Uhlmann, Johannes Vogel

### European Institute of Road Assessment

Olivera Rozi, Marko Ševrović

### University of Catania

Salvatore Damiano Cafiso, Giuseppina Pappalardo

### University of Zagreb

Leonid Ljubotina, Sanja Leš, Anđelo Marunica

**Contents:**

1	ABOUT THE EUROS@P PROJECT .....	3
2	INTRODUCTION.....	4
2.1	Intellectual Output 6 – general description.....	4
2.2	Agenda of didactic meeting .....	5
3	ACTIVITIES CARRIED OUT .....	6
3.1	Presentation of the RSI methodology in Poland .....	6
3.2	Test of the methodology .....	7
3.3	Presentation of the methodology to a focus group.....	11
3.3.1	BUW Team .....	11
3.3.2	UC Team.....	11
3.3.3	UZ Team .....	14
4	INTEGRATION OF THE OTHER PARTNERS IN THE IO .....	17
5	OUTCOME AND OUTLOOK .....	18

## 1 ABOUT THE EUROS@P PROJECT

The main objective of the EuroS@P project is to promote the best education solutions in the area of RISM directive, with an increase of awareness and knowledge of road safety, by:

- 1) Developing an e-learning platform with access to project products,
- 2) The development of teaching and training materials dedicated to conducting classes at universities and training courses for RISM staff,
- 3) Raising competencies and skills in RISM, by changing curricula at universities and equipping students and staff with didactic materials based on innovative RISM methods and tools,
- 4) Creating the foundations for Road Safety Professional Certification (RSP),
- 5) The development of a lasting relationship and the continuation of active international cooperation between project partners with the possibility of its extension to other institutions.

The EuroS@P project targets the following groups:

- 1) Students, researchers, and academic teachers at universities.
- 2) Road authority staff at national, regional and local levels.
- 3) Experts, specialists, and practitioners involved in RS activities, including staff who conduct training in various RS courses.
- 4) All users of road infrastructure, as an indirect target group, for whom the risk of road accidents will ultimately be reduced by increasing the effectiveness and efficiency of RISM activities.

The project is also supported by a group of associates who will cooperate with project partners to consult and evaluate the results. They will implement final products and promote the dissemination and accessibility of the project results.

### ABOUT OUTPUT IO.6

- **Objective:** Practical implementation of RSI methodology on the selected road sections in Poland
- **Work package:** The task falls under WP3 Teaching materials development related to the road infrastructure safety inspection.
- **Target Groups:**
  - Research and teaching staff from institutions involved in the project.
  - Students of civil engineering and transportation engineering taking part in pilot research in Poland.

## 2 INTRODUCTION

### 2.1 Intellectual Output 6 – general description

In the Intellectual Output 6, the RSI methodology developed in the project was tested in different locations in Poland. The task was carried out during the period September 2021 – May 2022.

The main objectives of the Intellectual Output were:

- Organization and conduct of road safety inspections in selected locations
- Indication of the benefit and drawback of the road safety inspection methodology performed in Poland
- Exchange of experiences and increasing the knowledge of project partners in the field of road safety inspections.

The following activities were carried out as part of IO.6:

1. preparatory work related to the selection of pedestrian crossings without traffic lights and test sections, preparation of maps and traffic data, organization of field research,
2. field work consisting of carrying out inspections on road sections and pedestrian crossings,
3. preparation of field research reports
4. presenting proposals for risk reduction actions
5. assessment and verification of the adopted methodology for conducting PCSI, PCSR and RSI.

Three types of road safety inspections were carried out: general inspection, carried out while driving a research vehicle, detailed inspection, carried out in selected locations (without a vehicle) and night inspection (without a vehicle).

Representatives of all partner countries participated in field research, preparation of reports and presentation of results.

The assessment of roads in Poland, including the selection process and subsequent analysis, developed by the UG (University of Gdansk) and UC (University of Cracow) for national roads. This methodology was utilised to identify critical road segments suitable for implementing the EuroS@P road safety inspection. To evaluate the safety of these chosen roads, the inspection team employed Poland method checklist during the on-site assessments, and the outcomes were subsequently discussed during the office review, following the protocol outlined in IO.5.

Timeline. The task was carried out during the period IX2021 – V2022:

March 2021	Internal Workshop to talk about the procedure
July 2021	Presentation of the methodology to the other partner
October 2021	Practical application of the methodology in Poland during the didactic workshop
March 2022	Discussion about the methodology

May 2022

Discussion about the results of the application of the elements of methodology

## 2.2 Agenda of didactic meeting

The workshops included testing the Polish inspection method and the method for assessing pedestrian crossings without traffic lights. This report covers part of the didactic workshops on inspections. Figure 1.1 shows the agenda of the meeting in Gdansk.

4.10.2021	<b>Monday</b>	10:00 – 13:00 Gdansk University of Technology - meeting 13:30 – 14:30 Gdansk University of Technology - Lunch 15:00 – 17:00 European Solidarity Centre - Visit 18:00 Motlava restaurant diner
5.10.2021	<b>Tuesday</b>	9:00 – 13:30 RSI and PCSI urban area- Day 13:30 – 14:30 Gdansk University of Technology - Lunch 19:00 – 20:30 Field research – RSI and PCSI - Night time – urban area
6.10.2021	<b>Wednesday</b>	9:30 – 14:00 RSI and PCSI, Malbork Castle 14:30 – 15:30 Malbork Restaurant- Lunch
7.10.2021	<b>Thursday</b>	9:00 – 13:30 RSI and PCSI rural area 13:30 – 14:30 Hel Peninsula - Lunch
8.10.2021	<b>Friday</b>	10:00 – 12:00 Gdansk University of Technology - meeting 12:00 – 13:00 Gdansk University of Technology - Lunch

Figure 1.1 – Meeting in Gdansk Agenda

### 3 ACTIVITIES CARRIED OUT

#### 3.1 Presentation of the RSI methodology in Poland

There are 3 types of RSI - general, detailed and special. General inspection covers the entire network of national roads and is regular and cyclical in nature, detailed inspection covers selected sections and places indicated on the basis of the Classification of Road Sections and the general inspection. Special inspection is carried out at night and a safety inspection in the area of road works.

General and special checks are carried out from the vehicle, while a detailed inspection is carried out outside the vehicle, it is necessary to provide protective clothing during its performance and in the case of motorways and dual carriageway expressways additional protection - a vehicle with a trailer, a truck closing the lane with a trailer.

The hazards identified during the inspection should be initially qualified (in the inspection cards) for those that should be removed immediately and those where actions can be taken over a longer period of time. Identified hazards should be assessed and classified into three hazard classes:

- Class A - low,
- Class B - medium,
- Class C – high.

Class C hazards should be corrected as soon as possible. There may be a need for a temporary security pending adjustment or repair. Defects in these classes may cause serious road accidents, hence the need for a quick reaction of appropriate road services. Class B hazards should be removed as part of a maintenance and modernization program, with priority depending on the degree of irregularity, traffic volume and site characteristics. Class A - hazards to be removed as part of maintenance activities.

Each RSi should take place once, of a limited length, which guarantees the appropriate quality of the inspectors' work. During general or special inspection, the assessed section of the road should be run twice (Inspection for both directions should be carried out separately).

With a team of 2-3 inspectors, before going into the field, the tasks for each inspector and possibly accompanying persons should be precisely defined. A maximum distance of 200 km is recommended (100 km of the road section is traveled in both directions). In the case of detailed inspections that require an on-site visit, there is no daily limit.

The mandatory equipment during the general or special inspection is a camera recording the entire journey, during detailed inspections - a camera, reflective vest. Additional equipment, e.g. a speed measuring device - depending on the needs. The General, Detailed and Special Control Cards, are not a mandatory element, but only supporting work during the performance of the Inspection.



### 3.2 Test of the methodology

In order to test the RSI method by partners from Germany, Italy and Croatia, the preparation of the materials used was started. The first stage was the preparation of appropriate presentations presenting the procedure for conducting a safety assessment in the area of a safety inspection in real conditions – general and detailed RSI. Figure 3.1 shows a photo of inspectors from partner countries.



Figure 3.1 Project Team during RSI in Poland

A road safety inspection was carried out on a section of approximately 29 km (provincial road DW216, section Rekowo Górne – Kuźnice: fig. 3.1) and intersection DW216 – Rekowska Street – fig 3.2. The inspection was performed by three independent teams (in three vehicles). During the inspection, the entire vehicle route was recorded. Inspectors also took photos and identified hazards on the assessed section. A drone was used during the detailed inspection. This allowed the entire intersection to be recorded, which facilitates its comprehensive assessment.



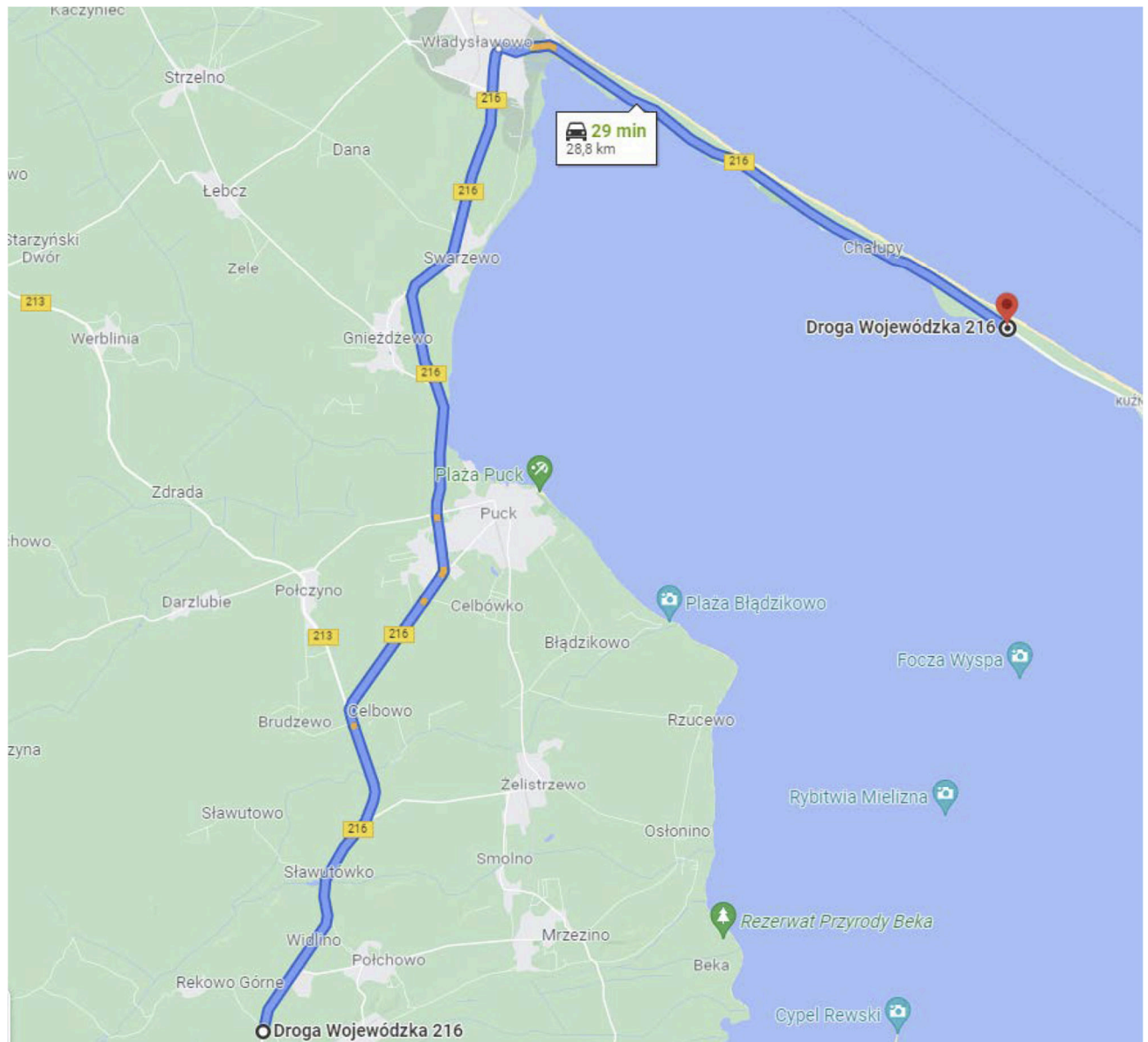


Figure 3.1 General RSI – road DW216 (source: [www.google.maps](http://www.google.maps))

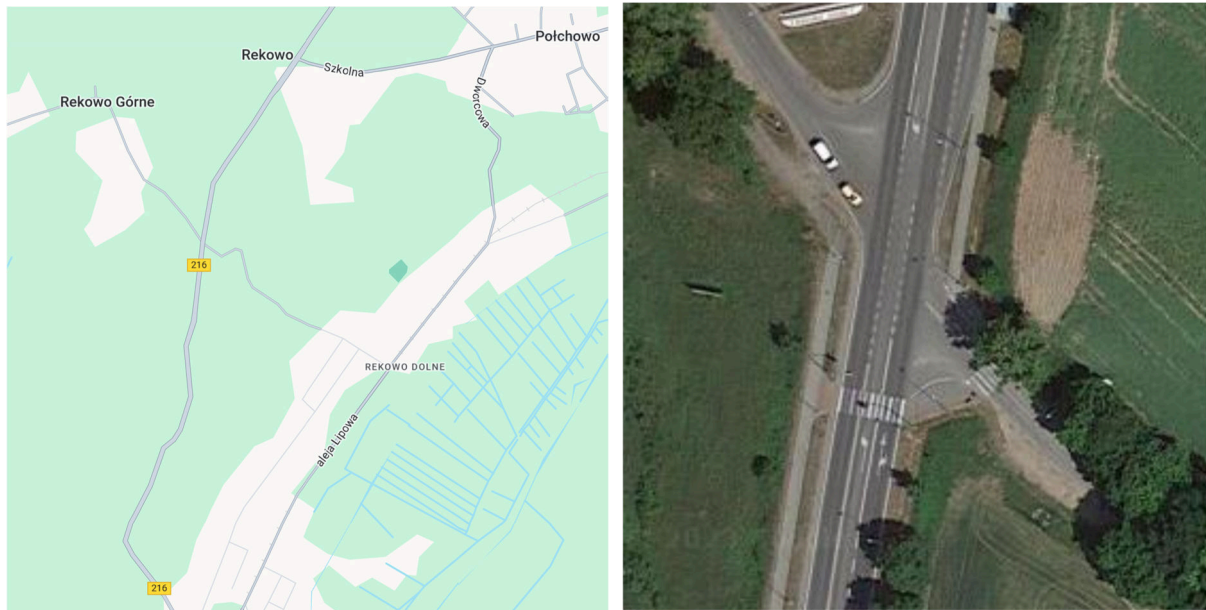


Figure 3.2 Detailed RSI – Intersection DW216 road – Rekowska Street (source: [www.google maps](http://www.google.com/maps))

**General RSI (GRSI)** is carried out during the day and is used to control the condition of elements located along the road (in the road lane and in the safety zone) and to assess their impact on road safety.

Figure 3.3 shows photos from the assessed section of the DW216 road.



Figure 3.3 Fotos from General RSI



General control is a systematic action relating to the road, performed at least once every 3 years and aimed mainly at identifying hazards on the road, which will enable effective and efficient maintenance and planning of investment works. General inspections are an activity consistent with the existing road inspection system in Poland and are complementary and detailed in relation to those aspects that should be treated as important from the road safety point of view.

**Detailed inspection (DRSI)** is performed during the day and serves to control specific places, selected after the Road Safety Classification (risk class E), as sections or points of concentration of road accidents. In addition, DRSI is performed as a result of general inspections, during which hazards were identified that pose a potentially high risk of severe accidents (fatalities and seriously injured) or as needed. The DRSI may refer to a selected road section, intersection or other specific place (pedestrian crossing, horizontal or vertical curve). During a detailed inspection, apart from the elements of the road infrastructure and roadside, the behavior of road users should also be monitored in terms of safety and the impact of selected elements of the road infrastructure and roadside on this behavior should be analyzed. Figure 3.3 shows photos from the assessed intersection on the DW216 road.



Figure 3.4 Fotos from Detailed RSI

### 3.3 Presentation of the methodology to a focus group

Each of the independent teams from partner countries prepared an exemplary list of identified hazards. The advantages and disadvantages of the method were also assessed.

#### 3.3.1 BUW Team

Identified hazards - detailed inspection (fig. 3.5).

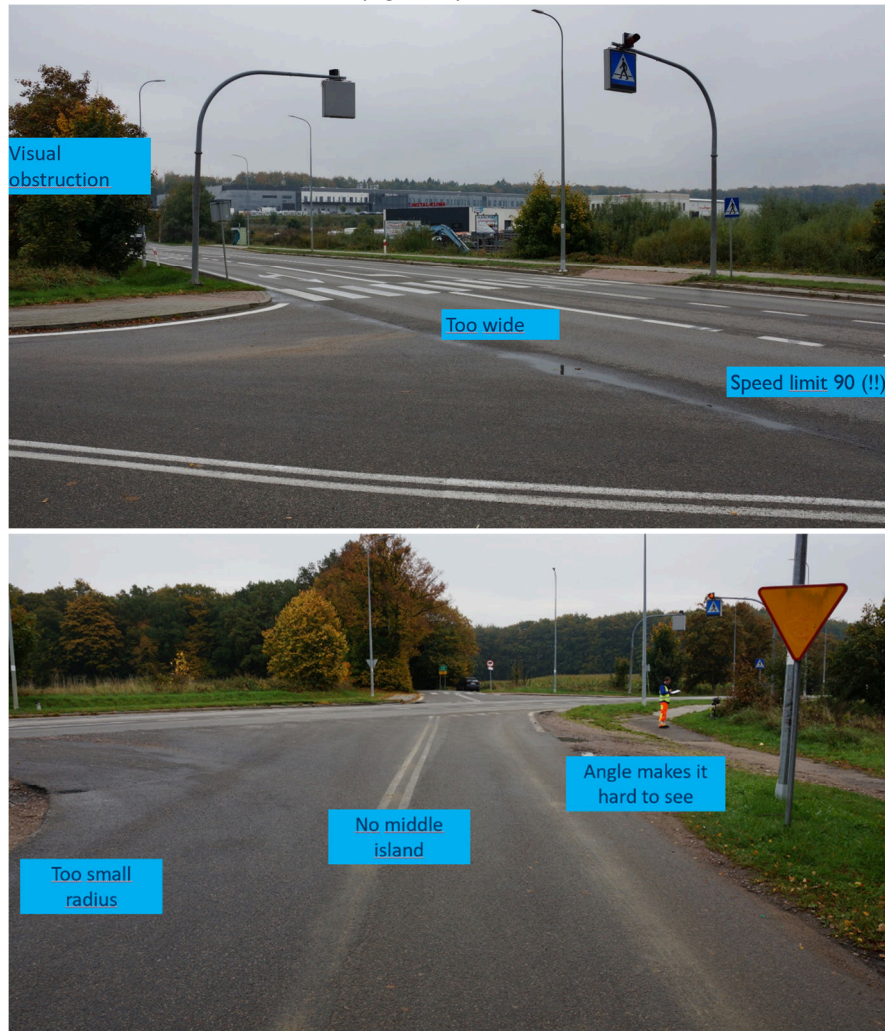


Figure 3.5 Identified hazard – BUM Team

#### 3.3.2 UC Team

The UC Team used additional equipment during the inspection (Video VBOX Lite). Figure 3.6 shows the equipment of a UC team.



## Video VBox Lite



- Built in **10 Hz GPS** data logger
- 2 camera inputs with configurable picture-in-picture. Output: 720 x 576 at 25 frames per second PAL
- 580L and 420L Bullet Cameras (optional)
- 4 CAN channels
- SD Card logging and USB 2.0 interface
- Stereo Audio recording
- MPEG4 encoding – approx. 2 GB per hour DVD quality, PAL or NTSC format
- Customisable real-time graphics, including gauges, bar graphs, circuit plots, lap times, and text
- Preview over USB for camera and graphics set-up

Velocity		Distance	
Accuracy	0.1 km/h (average over 4 samples)	Accuracy	0.05 % (<50 cm per Km)
Units	km/h or Mph	Units	metres / feet
Update rate	10 Hz	Resolution	1 cm
Maximum velocity	1600 km/h		
Minimum velocity	0.1 km/h		
Resolution	0.01 km/h		
Latency	<160ms		

Position		Acceleration	
2D Position	±3 m 95% CEP *	Accuracy	1 %
Height	10 m 95% CEP *	Maximum	4 G
		Resolution	0.01 G

Heading		Lap Timing (OLED/ Circuit Tools)	
Resolution	0.01° (average over 4 samples)	Resolution	0.01 s
Accuracy	0.1°	Accuracy	0.01 s



Figure 3.6 The UC Team additional equipment

Issues analysed during the inspections (fig. 3.7):

### Roadside





## Roadside



Roadside barrier with no breakway terminal



Concrete pole near the roadway to protect bike lane

## Accesses



Unpaved access



Too many signs together create confusion

Figure 3.7 The UC Team - identified hazards

## 3.3.3 UZ Team

The UZ team identified hazards on the analyzed section of the DW216 road (fig. 3.8) and indicated the advantages and disadvantages of the method (fig. 3.9).

### Typical roadside severity found on a section

Poles



Metal-concrete anti parking pillars



Trees



Deep drainage ditch



Figure 3.8 The UZ Team - identified hazards

## Benefits

Fast for critical hazard identification

Camera backup ensures no hazards are missed

Great network coverage in a timely manner

## Drawbacks

Requires a lot of focus and experience

Higher travelling speed could cause loss in detail

Video material needs to be furtherly processed and reassessed

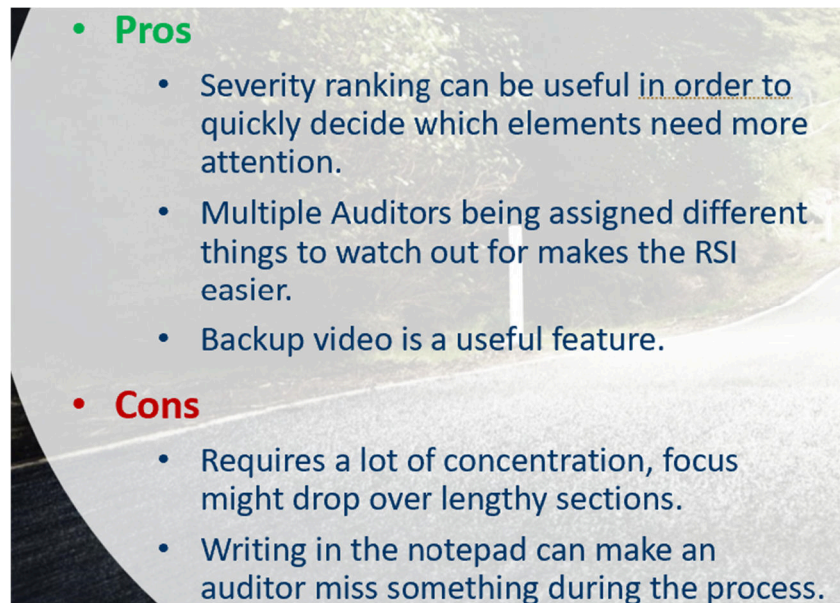
- 
- **Pros**
    - Severity ranking can be useful in order to quickly decide which elements need more attention.
    - Multiple Auditors being assigned different things to watch out for makes the RSI easier.
    - Backup video is a useful feature.
  - **Cons**
    - Requires a lot of concentration, focus might drop over lengthy sections.
    - Writing in the notepad can make an auditor miss something during the process.

Figure 3.9 The UZ Team - identified advantages and disadvantages of the Polish method RSI



#### 4 INTEGRATION OF THE OTHER PARTNERS IN THE IO

While the inspections and after it, the Partners provided input and were a partner in discussions regarding the adaptation of the methodology and the interpretation of the results.

As a central part of the integration of the project partners, the October 2022 Didactic Workshop took place in Gdansk. The project staff of UG presented the work to this point and organised an excursion to three locations. After the three partner teams completed the inspection, each team prepared a presentation. The joint discussion allowed us to identify the strengths and weaknesses of the method (fig. 4.1).



Figure 4.1 - Project partners during an didactic workshop in Gdansk

## 5 OUTCOME AND OUTLOOK

The result of the work of IO 6 was the preparation of materials and the presentation of the Polish methodology for conducting road safety inspection. Polish experience in the use of this method is also presented. Field tests were carried out and foreign partners had the opportunity to test the theory presented to them during the workshop in real conditions. The result of these tests and trials are opinions on the evaluation of the method and the possibilities of its application in the partner countries. All this is an object to be used in the creation of didactic mattresses.