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WP3. Theoretical and practical teaching materials related to Network Wide Road Safety Assessment

T3.1 Model road safety infrastructure management structure
T3.2 Network Wide Road Safety Assessment fundamentals
T3.3 The reactive approach of NRWSA
T3.4 The proactive approach of NRWSA
T3.5 Integration of selected activities using proactive and reactive methods
T3.6 Management of activities at strategic, operational and local levels

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1 ABOUT THE EUROSAP-NWRSA PROJECT

The main objectives of the **European Road Safety Partnership - Network Wide Road Safety Assessment** project are for students to gain knowledge and improve the competence and skills of road authorities, auditors, and road safety inspectors, as well as lecturers and experts (teaching staff) in the area of Network Wide Road Safety Assessment (NWRSA) as part of Road Infrastructure Safety Management (RISM).

To achieve this goal, international cooperation within the project will be necessary to increase the quality of education, allow for the exchange of knowledge between partners, and implement and disseminate innovative solutions.

Achieving the project's main objective will increase the possibilities of solving such a socially significant problem as road safety. The main aim will be achieved through the implementation of sub-objectives:

- Prepare the methodological basis and develop didactic and training materials for six courses, including competence certification.
- Building a knowledge base of stakeholders and professionals in RISM for European Union countries.
- The participants of the pilot training courses verified, evaluated and recommended the prepared didactic and training materials and methodologies.
- Disseminate information about the project and its results using digital tools.

Work packages 3

The main goal of WP3 is to prepare theoretical and practical teaching materials for six courses (D3.1-D3.6) based on methodologies developed in WP2. The developed materials will include lectures, practical activities, fieldwork and workshops.

Implementing the tasks outlined in this package will enable the development of modern didactic training materials, which will be a key element in the education process for the three target groups and will help achieve the project's primary goal.

The main goal will be achieved through the implementation of specific goals:

- preparing the didactic-training materials for six courses
- conducting two educational workshops.
- cooperation and knowledge exchange between Project Partners.

2 TEACHING PROGRAMME AND COURSE MATERIALS

The teaching programme comprises six courses and 67 scheduled class entries: 36 lectures, 21 practical classes, two field activities and eight workshops. The durations listed in the timetable total 5,400 minutes, equivalent to 90 hours of clock time or 120 teaching hours of 45 minutes. Practical classes account for 2,925 minutes, lectures for 1,530 minutes, field activities for 360 minutes and workshops for 585 minutes.

The table below presents each course by session number, class type, duration, short name and topic. It is followed by descriptions of the six courses, the types of teaching materials prepared and illustrations of selected resources. Together, these materials cover the foundations of road infrastructure safety management, reactive and proactive network assessment, integration of assessment results, and reporting and follow-up.

The following table presents the planned classes by course, class type, duration and topic. Duration is expressed in minutes.

Table 1. Timetable of the six NWRSA courses: class types, duration and topics

No.	Type of classes	Minutes	Short Name	Topic
Course 1 - Model road safety infrastructure management structure				
1.1	Lecture	135	Importance of Road Safety Infrastructure Management	Importance of road safety; the role of infrastructure; vulnerable road users; human factors; new technology; and the Safe System approach.
1.2	Lecture	45	Directive 2019/1936/EC	Introduction to the legal framework for RISM.
1.3	Lecture	90	RISM procedures	Objectives and application of RSIA, RSA, RSI and NWRSA within road infrastructure safety management.
1.4	Lecture	90	General statistics	Crash databases, statistical methods and surrogate measures of safety.
1.5	Practical	90	Statistical Exercise	Excel exercises cover descriptive statistics, confidence intervals and hypothesis testing using datasets such as vehicle speed measurements.
1.6	Lecture	45	Road network classification	Context, users, infrastructure.
1.7	Practical	135	Road network classification	Students use national guidance and QGIS resources to classify a selected regional road network and prepare a map of its road categories.
—	Workshop	45	To be confirmed	Workshop topic and teaching materials to be confirmed.
Course 2 - Network Wide Road Safety Assessment fundamentals				
2.1	Lecture	45	Introduction to Network-Wide Road Safety Assessments	Fundamental concepts and the significance of conducting safety assessments across a road network.

No.	Type of classes	Minutes	Short Name	Topic
2.1	Practical	90	Introduction to Network-Wide Road Safety Assessments	Group analysis of safety approaches and local challenges, supported by case studies and discussion of the benefits of network-wide assessment.
2.2	Lecture	45	NWRSA data collection	Types of data required for NWRSA and methods for collecting them.
2.2	Practical	135	NWRSA data collection	Participants develop a data collection plan and review data sources, monitoring techniques and case studies.
2.3	Lecture	45	Risk assessment and segment prioritisation	NWRSA methodologies for assessing risks and prioritising road segments for interventions based on risk levels and risk types.
2.3	Practical	90	Risk assessment and segment prioritisation	A prioritisation exercise uses fictional road examples, risk categories and practical assessment tools, including ViDA.
2.4	Lecture	45	NWRSA follow-up procedures	The steps/procedures for following up on NWRSA assessments.
2.4	Practical	90	NWRSA follow-up procedures	Participants prepare a follow-up plan, consider updated risk information and discuss selected case studies.
2.5	Workshop	90	Application of Practical Tools	Collect all data on the given example.
Course 3 - The reactive approach of NWRSA				
3.1	Lecture	45	The process of accident based network safety analysis	Overview and the stages of the accident based Network Safety Management process.
3.2	Lecture	45	Segmentation of the road network	Grouping and segmentation of the road network using homogeneous study units, traffic characteristics and road design parameters.
3.3	Practical	90	Segmentation of the road network	Practice on real world data for one region.
3.4	Lecture	45	Linking accidents to the individual road sections	Linking crash records to road sections and preparing inputs for reactive risk assessment.
3.5	Practical	90	Linking accidents to the individual road sections	Practice on real world data for one region.
3.6	Lecture	45	Identifying hazardous sections	Comparison of recorded and expected injury-severity density with reference values for similar sections to identify hazardous locations.
3.7	Practical	135	Identifying hazardous sections	Practice on real world data for one region.
3.8	Workshop	90	Workshop	Methodological issues in statistical analyses.

No.	Type of classes	Minutes	Short Name	Topic
3.9	Lecture	45	Diagnosis of safety problems and site inspection	Collision diagrams, crash maps, and site information support the diagnosis of safety problems and the preparation for targeted inspection.
3.10	Practical	135	Diagnosis of safety problems and site inspection	Practice on real world data for one region.
3.11	Lecture	45	Selection of countermeasures, Economic appraisal and priority ranking	Selection of countermeasures, socio-economic appraisal and priority ranking, accounting for technical and budget constraints.
3.12	Practical	135	Selection of countermeasures, Economic appraisal and priority ranking	Practice on real world data for one region.
3.13	Lecture	45	Plan for the evaluation of the effects of the proposed measures	Planning before-and-after evaluation of implemented measures while considering exposure and external influences.
3.14	Practical	90	Plan for the evaluation of the effects of the proposed measures	Practice on real world data for one region.
3.15	Workshop	90	Workshop	Methodological issues in before-and-after studies.
Course 4 - The proactive approach of NWRSA				
4.1	Lecture	30	Motorways	Detailed motorway data collection, section definition, coding and scoring.
4.2	Lecture	30	Motorways	General, traffic volumes, and operational characteristics.
4.3	Lecture	30	Motorways	Geometric characteristics.
4.4	Practical	225	Motorways	Practical work on motorway data collection and geometric assessment can use the supplied lecture examples and coding resources. No dedicated presentation for this numbered session was supplied.
4.5	Lecture	30	Motorways	Objects, clear zones and road restraint systems.
4.6	Lecture	30	Motorways	Bridges and tunnels:
4.7	Lecture	30	Motorways	Interchanges.
4.8	Practical	225	Motorways	Practical work on motorway roadside and interchange assessment can use the supplied examples and calculation resources. No dedicated presentation for this numbered session was supplied.
4.9	Lecture	15	Motorways	Maintenance.
4.10	Lecture	15	Motorways	Vulnerable road users' facilities:

No.	Type of classes	Minutes	Short Name	Topic
4.11	Lecture	15	Motorways	Incident monitoring, road-user information, automatic incident detection and coordination with response and emergency services.
4.12	Practical	225	Motorways	NWA Proactive.
4.13	Field activities	180	Motorways	Field recording instructions, S7 maps and GIS layers support section identification and infrastructure coding using referenced video recordings. A Word and PDF manual guides evidence collection and quality checks.
4.14	Workshop	45	Motorways	The workshop uses GIS network layers, Excel coding and calculation tools and a Word form to assess a motorway section and propose safety improvements.
4.15	Lecture	30	Undivided road	Detailed data collection, section definition, coding and scoring for undivided roads.
4.16	Lecture	30	Undivided road	General, traffic volumes, and operational characteristics.
4.17	Lecture	30	Undivided road	Geometric characteristics.
4.18	Practical	225	Undivided road	Practical work on undivided-road data collection and geometry can use the supplied inspection criteria and field examples. No dedicated presentation for this numbered session was supplied.
4.19	Lecture	30	Undivided road	Objects, clear zones and road restraint systems.
4.20	Lecture	15	Undivided road	Bridges and tunnels.
4.21	Lecture	30	Undivided road	Interchanges, Intersections, Roundabouts.
4.22	Practical	225	Undivided road	Worksheets support the assessment of proactive risk factors on undivided roads, with lecture examples covering roadside hazards and junction features.
4.23	Lecture	30	Undivided road	Maintenance.
4.24	Lecture	30	Undivided road	Vulnerable road users' facilities.
4.25	Field activities	180	Undivided road	National-road and regional-road maps, Shapefile and KMZ layers support infrastructure coding from referenced video recordings. Participants prepare a mapped inventory and an evidence log.
4.26	Practical	225	Primary undivided road	NWA Proactive.
4.27	Workshop	45	Undivided road	The workshop uses GIS network layers, the NWA-proactive Excel tool, and a Word form to assess an undivided road section and propose safety improvements.

No.	Type of classes	Minutes	Short Name	Topic
Course 5 - Integration of selected activities using proactive and reactive methods				
5.1	Lecture	45	Methodology of proactive and reactive activities integration	How to integrate NWRSA results and why.
5.2	Practical	180	Integrated analysis of NWRSA	Integration of reactive and proactive.
5.3	Workshop	135	Example road	Teams integrate reactive and proactive results using GIS datasets and record priorities and recommendations in a Word assessment form.
Course 6 - Management of activities at strategic, operational and local levels				
6.1	Lecture	45	Reporting, dissemination	Communicating RISM results to different audiences and supporting implementation through suitable messages and presentation formats.
6.2	Practical	45	Reporting, dissemination	Prepare a dataset for presentation.
6.3	Lecture	90	Follow up of NWRSA	Follow-up decisions after NWRSA, including targeted inspection, prioritisation and cost–benefit analysis.
6.4	Practical	45	Follow up of NWRSA	Slide-based tasks and worked solutions cover integrated classification, targeted inspection, economic appraisal, budget-constrained programme selection and sensitivity analysis.
6.5	Workshop	45	Example road	Teams analyse the results of calculations.

The timetable presents the planned classes and their durations, as supplied for this report. Items marked “To be confirmed” require further specification before delivery.

3 COURSE DESCRIPTIONS

3.1 Course 1 - Model road safety infrastructure management structure

Course 1 introduces Road Infrastructure Safety Management (RISM). It combines theoretical and legal foundations with practical exercises in data analysis and the use of geographic information systems. The package includes lecture presentations, practical session instructions, Excel workbooks, and the supplementary folder 1.7.3, which contains GIS data for the exercises.

Section 1.1 explains the importance of road infrastructure safety management, the scale of the road crash problem, factors contributing to crashes and the Safe System approach. Section 1.2 discusses Directive (EU) 2019/1936 amending Directive 2008/96/EC, including the scope of the procedures, the protection of vulnerable road users and requirements for assessing and improving road safety. Section 1.3 develops the main RISM procedures: Road Safety Impact Assessment (RSIA), Road Safety Audit (RSA), Road Safety Inspection (RSI) and Network-wide Road Safety Assessment (NWRSA). It presents their objectives, stages and applications in infrastructure planning, design and operation.

Sections 1.4 and 1.5 cover basic statistics and their practical application. The lecture introduces data types, measures of central tendency and dispersion, distribution shape and methods of visualising results. The accompanying Excel workbooks support exercises in descriptive statistics, confidence intervals and hypothesis testing. These materials enable students to move from understanding the methods to working with data, including vehicle speed measurements.

Section 1.6 presents road network classification, road functions and the characteristics of urban roads, rural roads and roads intended for high-speed traffic. These topics are developed in practical session 1.7.1, in which each student analyses a selected region in QGIS. Students interpret OpenStreetMap road tags, develop a documented mapping to the national road classification, calculate road lengths, category shares and network density, and prepare a map and a short presentation of their findings. The exercise also addresses the police data required for spatial road safety analysis.

Tutorial 1.7.2 supports learning QGIS, obtaining OSM data, working with coordinate reference systems, applying symbology, selecting features, creating buffers, clipping layers and calculating shortest paths. Folder 1.7.3 provides GIS data for the practical sessions. The package also includes workbook 1.7.4, which contains Eurostat population, road fatality, and injury data for 2022–2024 for selected NUTS 2 regions in Croatia, Poland, Germany, Italy, and Sweden. These regional data support comparisons and provide a broader road safety context; they do not replace individual crash location records or traffic volume data.

3.2 Course 1 - Types of didactic and training resources

The supplied Course 1 package contains 11 teaching files: 7 PowerPoint presentations (.pptx) and 4 Excel workbooks (.xlsx). The presentations comprise 5 lectures, 1 practical presentation

and 1 QGIS tutorial; the workbooks comprise 3 statistical exercises and 1 regional road-safety dataset. No separate Word, PDF or GIS data files are included in the supplied archive; links to external tutorial videos are embedded in the presentation and are not counted as separate files.

Course 1 introduces the principles of Road Infrastructure Safety Management (RISM), combining theoretical and legal foundations with statistical and spatial analysis. The teaching materials support an understanding of road safety procedures, road network classification and the interpretation of transport and safety data. They combine lecture presentations, practical exercises, software tutorials and datasets, enabling students to apply the concepts to selected regions and national road systems. The course includes the following forms of teaching and learning:

- lectures covering the importance of road infrastructure safety management and the Safe System approach; the European regulatory framework, including Directive (EU) 2019/1936; road safety impact assessments, audits, inspections and network-wide assessments; basic statistical methods; and road functions and network classification,
- practical statistical exercises supported by Excel workbooks, in which students analyse datasets, calculate descriptive statistics, determine confidence intervals and test hypotheses, developing their ability to interpret results and assess differences between observations,
- a practical QGIS session in which students analyse the road network of a selected region, relate OpenStreetMap road categories to national classifications, calculate road lengths, category shares and network density, and prepare a map and a short presentation explaining their methods, findings and limitations,
- a QGIS tutorial combining links to instructional videos, knowledge-check questions and practical tasks, covering GIS fundamentals, data acquisition from OpenStreetMap and Geofabrik, coordinate reference systems, cartographic representation, feature selection, buffering, clipping and shortest-path analysis,
- supporting datasets, including the GIS materials provided in folder 1.7.3 and an Excel workbook containing Eurostat population, road fatality and injury data for selected NUTS 2 regions in 2022–2024, enabling regional comparisons while distinguishing aggregated statistics from the local crash records and traffic exposure data required for detailed safety analysis.

Figures 1–4 illustrate the lecture slides, QGIS tutorial tasks and supporting Excel data used in Course 1.

Network-wide Road Safety Assessment

- Purpose:
  - Identify parts of the network with a high likelihood of crashes
- When:
  - During the operation of the road network, every few years
- Scope:
  - Entirety of the road network
- Example (Germany):
  - Empfehlungen für die Sicherheitsanalyse von Straßennetzen (ESN)

Figure 1. Lecture slide explaining network-wide road safety assessment.
Source: Course 1, Lecture 1.1, Importance of RISM, slide 37.

Task 1

Download the data using the QuickOSM plugin. Make sure that the selected area covers the surroundings of the Arc de Triomphe in Paris (see the next slide).

Priority	Theme	OSM Key	OSM Value	Purpose
	Roads	highway	(leave empty)	road network
	Buildings	building	yes	buildings
	Land use	landuse	(leave empty)	urban and land-use areas
	Water bodies	natural	water	lakes and water bodies
	Waterways	waterway	(leave empty)	rivers and streams
	Natural areas	natural	(leave empty)	forests and natural features
	Railways	railway	(leave empty)	railway infrastructure
	POI	amenity	(leave empty)	public facilities / POI
Optional	Traffic	highway	traffic_signals	traffic signals
Optional	Transport	public_transport	(leave empty)	transport stops
Optional	Places	place	(leave empty)	place names / labels

Figure 2. QGIS tutorial task specifying OSM data to download using QuickOSM.
Source: Course 1, Tutorial 1.7.2, Tutorial QGIS, slide 11.

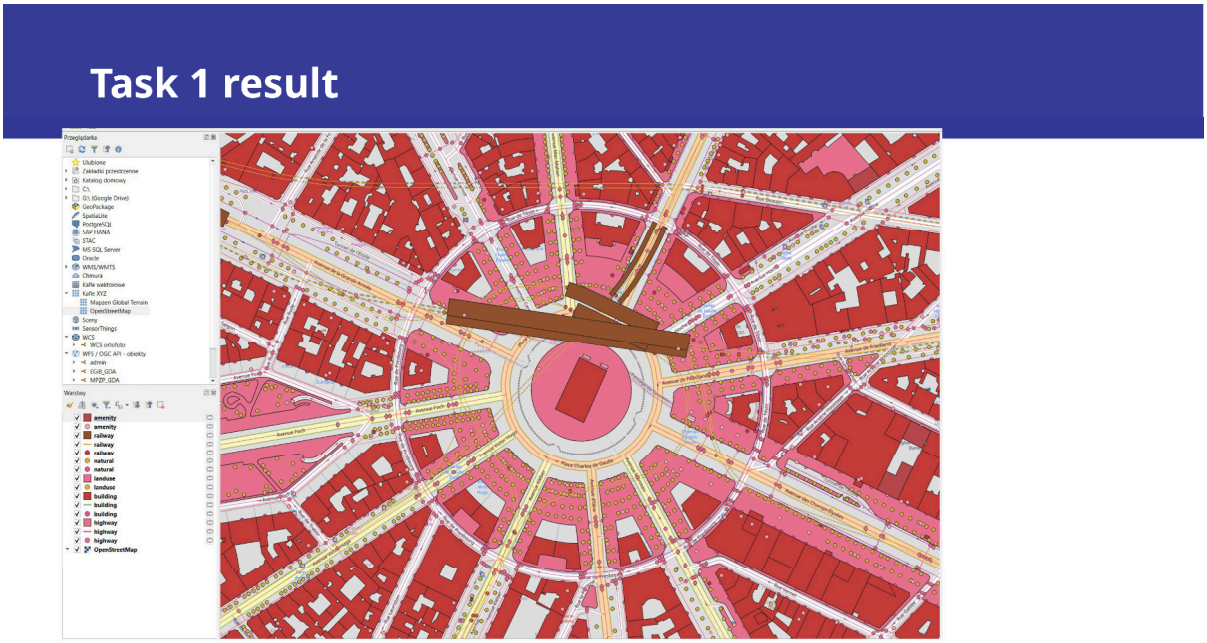


Figure 3. QGIS tutorial example showing the result of the OSM data download task.
Source: Course 1, Tutorial 1.7.2, Tutorial QGIS, slide 13.

Country	NUTS 2 code	NUTS 2 region	Year	Population on 1 January	Killed [KIL]	Injured [INJ]
Croatia	HR06	Sjeverna Hrvatska	2022	785,699	65	2,290
Croatia	HR06	Sjeverna Hrvatska	2023	785,177	46	2,269
Croatia	HR06	Sjeverna Hrvatska	2024	788,896	33	2,444
Croatia	HR02	Panonska Hrvatska	2022	1,013,572	82	3,601
Croatia	HR02	Panonska Hrvatska	2023	999,106	81	3,998
Croatia	HR02	Panonska Hrvatska	2024	990,636	90	3,926
Croatia	HR03	Jadranska Hrvatska	2022	1,296,210	106	5,287
Croatia	HR03	Jadranska Hrvatska	2023	1,297,987	129	5,693
Croatia	HR03	Jadranska Hrvatska	2024	1,310,313	99	5,710
Poland	PL63	Pomorskie	2022	2,295,510	100	1,945
Poland	PL63	Pomorskie	2023	2,295,745	109	1,841
Poland	PL63	Pomorskie	2024	2,296,972	115	2,040
Poland	PL62	Warminsko-mazurskie	2022	1,311,843	84	928
Poland	PL62	Warminsko-mazurskie	2023	1,303,380	77	874
Poland	PL62	Warminsko-mazurskie	2024	1,294,712	81	872
Poland	PL51	Dolnoslaskie	2022	2,822,229	138	2,201
Poland	PL51	Dolnoslaskie	2023	2,813,919	122	2,079
Poland	PL51	Dolnoslaskie	2024	2,805,463	145	2,230

Figure 4. Excel data extract for regional road safety comparisons in 2022–2024.
Source: Course 1, workbook 1.7.4, Eurostat NUTS2 population, road fatalities and injuries, worksheet "Region data".

The Excel extract presents population on 1 January and annual numbers of killed and injured road users for selected Croatian and Polish regions. It supports regional comparisons; it does not identify individual crash locations.

3.3 Course 2 - Network Wide Road Safety Assessment fundamentals

Course 2 develops the fundamentals of Network-Wide Road Safety Assessment (NWRSA), linking its role in road safety management with data collection, risk assessment, road segment prioritisation and follow-up procedures. The materials provided for Sections 2.1–2.5 comprise four lecture presentations, four practical presentations, a workshop presentation, an exercise

workbook and an inspection checklist in Word and PDF formats, together with GIS input datasets. They combine reactive, proactive and integrated assessment approaches with practical tasks that lead from network screening to targeted inspection, treatment planning and review of decisions.

Section 2.1 introduces NWRSA, its place within the RISM cycle and its relationship with the Safe System approach and the European regulatory framework. It discusses the limitations of relying solely on black-spot identification, the benefits of network-wide assessment for road users and road authorities, and international examples, including IASP, Sustainable Safety, Vision Zero, the Highway Safety Manual and ANRAM. The accompanying 90-minute workshop engages students in comparing safety approaches, discussing local challenges and analysing a selected case. Working in groups, students divide a road into homogeneous sections, justify a risk ranking and propose a proactive improvement.

Section 2.2 explains the data required for NWRSA, including road network geometry and attributes, crash records, traffic volumes, operating speeds and pedestrian and cyclist flows. The lecture covers data collection techniques, survey planning, equipment, georeferenced video, GPS quality, data transfer and road attribute coding. It illustrates input requirements and tools for iRAP Crash Risk Mapping, iRAP Star Rating and the EU network-wide assessment approaches. The practical session focuses on planning a road survey on a specified network. Students determine the route and recording directions, prepare a daily schedule and estimate survey duration, travel distance, fuel use, tolls and accommodation costs under given operational constraints.

Section 2.3 presents methods of risk assessment and segment prioritisation using crash-based and infrastructure-based evidence. It introduces iRAP Crash Risk Mapping and Star Rating, the EU network-wide assessment methodology and the interpretation of combined results. The lecture discusses indicators such as crash density, crash rates, severity-weighted rates and crash costs, together with safety classifications and the potential for improvement. It also explains the development of Safer Roads Investment Plans, countermeasure selection and prioritisation using benefit–cost ratios and estimated reductions in fatalities and serious injuries.

The practical component of Section 2.3 combines numerical exercises with guided use of the iRAP ViDA Star Rating Demonstrator. Students use a road network example with three years of crash data to calculate crash density, severity-weighted crash rates and crash costs, compare the resulting rankings and identify priority segments. The software instructions guide students through access to ViDA, selection of road configurations and coding of attributes related to roadsides, intersections, traffic flows, vulnerable road users and speed. Illustrated road examples support exploration of how infrastructure characteristics and operating conditions affect safety ratings.

The exercise workbook in Section 2.3.3 supplements the practical presentation with five illustrated proactive assessment examples. Each example provides a road image, speed information and structured tables for recording Star Rating Scores (SRS) and star ratings for vehicle occupants, motorcyclists, pedestrians and cyclists. Students assess the existing road,

propose up to five countermeasures and record the corresponding scores and ratings for the proposed improved configuration. Comment fields support interpretation of the results and comparison of the anticipated benefits for different road user groups. The Word version enables students to complete and document their group work, while the PDF provides the same exercise material in a fixed layout.

Section 2.4 addresses follow-up procedures after NWRSA, explaining how prioritised sections progress to targeted Road Safety Inspections (RSI) or direct remedial action. The lecture distinguishes RSI from road safety audits and routine maintenance, and presents four stages: office preparation, on-site investigation, inspection reporting, and implementation and evaluation of countermeasures. It covers inspection checklists, documentation of deficiencies, infrastructure and human factors, vulnerable road users, and the timing of inspections under relevant traffic, lighting and seasonal conditions. It also introduces User Defined Investment Plans (UDIP), illustrating the assignment of countermeasures to individual segments and presenting an example for the DC3 state road in Croatia. These materials connect network-level assessment with detailed treatment planning, monitoring and reassessment.

The practical materials in Sections 2.4.2–2.4.4 translate the follow-up procedure into a sequence of desktop exercises. Students use QGIS to review integrated network assessment results, crash locations and traffic exposure, select a priority road section and justify their choice. They then examine the selected section using Google Street View imagery, document safety deficiencies and recommend improvements. A further road section is provided as a homework assignment. The accompanying GeoPackage files contain crash data, integrated assessment results for the Cyprus road network and segments for the additional inspection exercise. The targeted RSI checklist organises findings into nine areas: road function and traffic; cross-section; alignment and human factors; intersections and access; signs, markings and lighting; roadside and passive safety; vulnerable road users; crash analysis; and countermeasures and prioritisation. It provides fields for responses, key findings, actions, priorities and a summary. These desktop tasks support identification of issues and evidence gaps that require subsequent verification on site.

Section 2.5 consolidates the course through a 90-minute workshop based on Kolb's experiential learning cycle. Groups of three or four students work with synthetic data for four road sections and choose a first priority for targeted inspection. Through concrete experience, reflective observation, abstract conceptualisation and active experimentation, they examine assumptions, distinguish crash counts from exposure-based indicators and develop a justified decision rule. Revised traffic data and new evidence about pedestrian activity, infrastructure and speed require students to reconsider their initial choice and test its sensitivity. Each group prepares an inspection and follow-up brief specifying checks, a conditional countermeasure, responsibility, timing and a monitoring indicator. Peer review and individual reflection complete the cycle. The presentation includes three worksheets, a facilitator calculation key and an assessment rubric.

3.4 Course 2 - Types of didactic and training resources

The supplied Course 2 packages contain 16 teaching files: 9 PowerPoint presentations (.pptx), 2 Word documents (.docx), 2 PDF documents and 3 GIS GeoPackages (.gpkg). The presentations comprise 4 lectures, 4 practical presentations and 1 workshop. The Word and PDF files provide two resources in alternative formats: the illustrated assessment exercises and the targeted RSI checklist. No separate Excel workbook is included; worksheets embedded in presentations are not counted as additional files.

Course 2 develops the fundamentals of Network-Wide Road Safety Assessment (NWRSA), combining conceptual explanations with data analysis, network screening and follow-up planning. The materials support the interpretation of reactive, proactive and integrated assessment results and their use in selecting road sections for further investigation. They include lecture and practical presentations, illustrated exercises, inspection checklists, GIS datasets and workshop worksheets. The course includes the following forms of teaching and learning:

- lectures covering the role of NWRSA within road infrastructure safety management; the Safe System approach and European regulatory framework; data requirements and collection methods; crash-based and infrastructure-based risk assessment; segment prioritisation; and follow-up procedures, including targeted road safety inspections and countermeasure planning,
- guided practical exercises and case-based discussions in which students compare assessment approaches, plan a road survey, calculate crash indicators and interpret different rankings of road sections. Numerical tasks connect crash frequency and severity with traffic exposure and support a justified selection of priority segments,
- software demonstrations and illustrated assessment exercises using the iRAP ViDA Star Rating Demonstrator. Students code road attributes, assess existing conditions for different road-user groups, propose countermeasures and compare Star Rating Scores and star ratings before and after the proposed improvements, recording their results in the accompanying exercise workbook,
- desktop targeted RSI exercises supported by QGIS, Google Street View imagery and a structured inspection checklist. Students examine network assessment results and crash locations, select a road section, identify potential safety deficiencies and record findings, recommended actions and priorities. A further section is provided for individual homework,
- supporting GIS datasets and recording templates, including GeoPackage files with crash data, integrated assessment results for the Cyprus road network and road segments for the additional inspection exercise. The targeted RSI checklist covers nine areas and provides fields for findings, actions, priorities and an inspection summary,
- a 90-minute workshop based on Kolb's experiential learning cycle, in which groups of three or four students use synthetic data for four road sections to select an inspection priority, reflect on assumptions, formulate a decision rule and revise their choice when new evidence is introduced. Worksheets guide the initial decision, revised analysis and inspection brief; peer review, a facilitator calculation key and an assessment rubric support feedback and evaluation.

Figures 5–10 illustrate selected lecture and practical slides, a targeted RSI checklist and workshop resources used in Course 2. Slide references indicate the slide position in the source presentation.

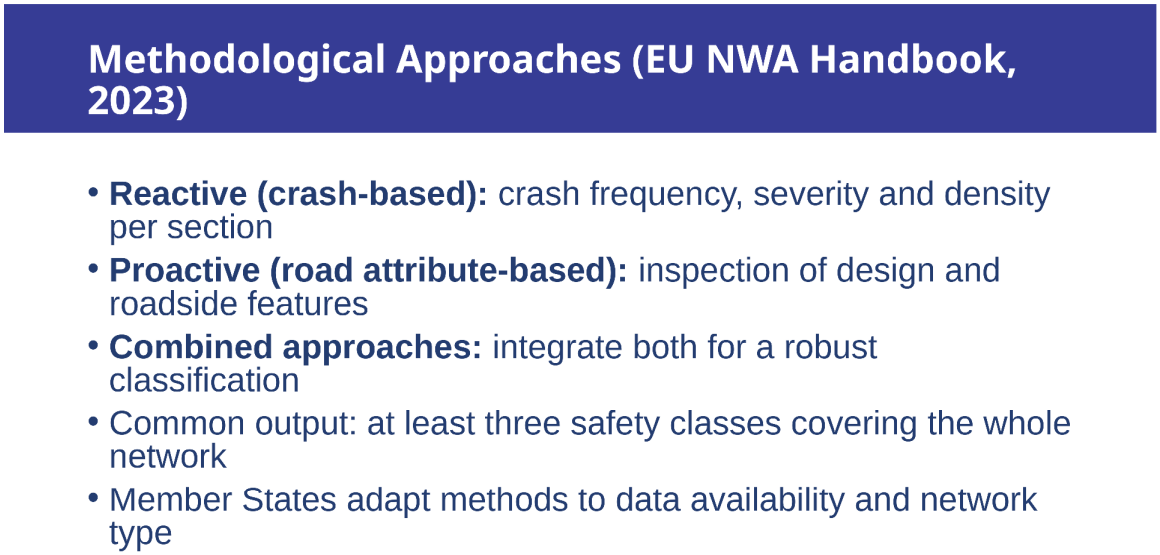


Figure 5. Lecture slide comparing reactive, proactive and combined approaches to NWRSA.
Source: Course 2, Lecture 2.1.1, Introduction to Network-Wide Road Safety Assessments, slide 12.

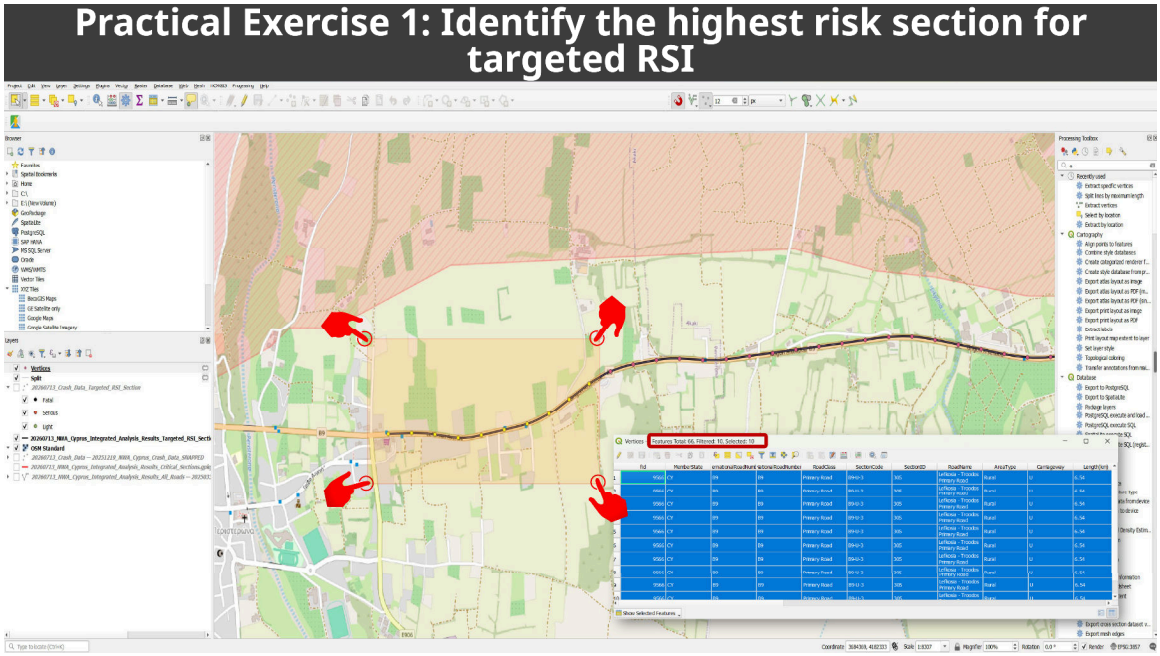


Figure 6. QGIS example showing a road section, mapped crash locations and an attribute table.
Source: Course 2, Practical 2.4.2, Follow-up procedures, slide 38.



Figure 7. Road photograph and contextual data used for the desktop targeted RSI exercise. Source: Course 2, Practical 2.4.2, Follow-up procedures, slide 54.

Targeted Road Safety Inspection Checklist for Practical Exercises

1. Road Function and Traffic					
ID	Question	Yes/No	Key Finding	Action	Priority
1.1	Is road function consistent with the design?				
1.2	Is the design appropriate for the traffic volume and structure?				
1.3	Do operating speeds match the expected speed?				
1.4	Are environmental factors increasing crash risk?				

Figure 8. Extract from the targeted RSI checklist covering road function and traffic. Source: Course 2, Practical 2.4.3, Targeted RSI Practical Exercises Checklist, p. 1 (extract).

Case data: four road sections

Section	Length (km)	AADT (veh/day)	FSI crashes / 3 years
A	2.0	12,000	8
B	1.0	4,000	3
C	3.0	6,000	4
D	2.0	2,000	0

FSI = fatal or serious injury. AADT = annual average daily traffic.

Synthetic teaching data. One common period and crash definition.

7

Figure 9. Synthetic dataset for comparing four road sections in the Kolb workshop. Source: Course 2, Workshop 2.5, NWRSA Workshop, slide 8.

Worksheet C: inspection and action brief

Item	Group response
Section, location and affected road users	
Check 1: measurement and conditions	
Check 2: measurement and conditions	
Conditional measure, owner and deadline	
Monitoring indicator and review date	

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Figure 10. Workshop worksheet for preparing an inspection and action brief. Source: Course 2, Workshop 2.5, NWRSA Workshop, slide 28.

3.5 Course 3 - The Reactive approach of NRWSA

Course 3 develops the reactive approach to Network-Wide Road Safety Assessment (NWRSA), using recorded crashes to identify hazardous road sections, diagnose safety problems and support treatment decisions. The materials cover the assessment process, road network segmentation, spatial allocation of crashes, risk classification, diagnosis, countermeasure selection and evaluation. Lecture presentations are complemented by guided GIS exercises, crash records, spreadsheet tools, worked solutions and two workshops addressing the application and methodological reliability of reactive assessment.

Section 3.1 explains the stages of accident-based network safety analysis, from segmentation and crash data preparation to the identification of hazardous sections, diagnosis, site inspection, treatment prioritisation and evaluation. It distinguishes recorded, predicted, and expected crash numbers and introduces the Empirical Bayes method to combine observed crashes with predictions for comparable sites. The lecture discusses random fluctuations, systematic differences between road sections, local risk factors and crash severity. Extended collision diagrams and inspection findings connect statistical screening with the identification of infrastructure-related safety problems. Economic appraisal and before-and-after evaluation complete the process, with attention to traffic changes, wider safety trends and regression to the mean.

Sections 3.2 and 3.3 address the division of the road network into assessment units. The lecture presents segmentation criteria for reactive and proactive assessment, including road function, cross-section, traffic volume, speed and junction boundaries. It discusses the balance between homogeneous sections and fixed-length units and illustrates the resulting network classification. The accompanying QGIS practical provides step-by-step instructions for creating a road centreline, dividing it into 10-metre elements, assigning identifiers, coordinates and chainage, and adding traffic data. Students identify main intersections, assign section identifiers and aggregate the elements into road sections between intersections. The final tasks cover the cartographic presentation of the segmentation results. Supporting files in Section 3.3.2 provide the B8 road centreline, a route start point, main intersections and an AADT workbook for the segmentation exercise.

Sections 3.4 and 3.5 explain how crashes are linked to individual road sections and used in reactive risk assessment. The lecture discusses crash-location records, data quality and GIS analysis, including examples from Croatia. It presents the EU NWA reactive methodology, the selection of comparable reference populations, crash rates and densities, and confidence intervals based on the Poisson method. Comparison with reference values supports classification into low-risk, unsure and high-risk categories, followed by mapping of the results. The accompanying QGIS practical guides students through importing crash data, setting a projected coordinate reference system, filtering fatal and serious-injury crashes, creating buffers around the B8 road centreline and counting crashes within section polygons. Students join the counts to road sections, calculate section lengths and export the attribute table to the NWA reactive spreadsheet tool. They then transfer the calculated classifications back to QGIS and prepare a risk map. The input package contains a road-centreline GeoPackage, a crash-data workbook and the NWA reactive assessment workbook.

Sections 3.6 and 3.7 address the identification of hazardous road sections using crash severity, variation between sections and the Empirical Bayes approach. The lecture introduces severity-weighted indicators, comparisons with similar road categories, and the distinction between recorded, normal, and expected values. The practical is supported by two ODS spreadsheets: a raw-data sheet containing section identifiers, road numbers, lengths, categories, AADT and crash counts by severity, and a worked-solution sheet. The latter illustrates severity-weighted calculations, category reference values, expected values and their differences from the reference level, supporting the selection of sections for further investigation.

Section 3.8 provides a workshop applying the complete reactive NWRSA procedure to assigned roads. Teams of five to ten participants use QGIS and Excel to check input data and segmentation, calculate crash density and crash rate, assign risk classes and identify three priority sections. They compare the priorities obtained from the two indicators, discuss possible contributing factors and additional data needs, and recommend follow-up actions. The workshop allocates 90 minutes to analysis and 30 minutes to presentations; each team completes an assessment form and delivers a ten-minute presentation, including questions and discussion.

Section 3.9 introduces detailed diagnosis through crash maps and collision diagrams. International examples illustrate the role of maps in identifying clusters. At the same time, the German diagram convention is used to explain symbols for road users, travel directions, manoeuvres, lighting, road-surface conditions and crash severity. A worked intersection example demonstrates how a written crash description is translated into a diagram. These materials prepare students for the subsequent case-based diagnosis and countermeasure exercises.
The materials in Sections 3.10 and 3.11 connect the diagnosis of safety problems with the selection and economic assessment of countermeasures. The practical input presentation uses collision diagrams, road photographs and inspection findings for five hazardous subsections of a road. Students calculate crash costs, propose treatments, estimate safety benefits and implementation costs, and assess net benefits for individual subsections and the complete road section. A separate worked-solution presentation supports comparison and discussion of the results. The lecture explains how evidence on countermeasure effectiveness can inform treatment choices, considering cost-effectiveness, durability, possible adverse effects and implementation requirements. Examples include shoulder treatment, junction improvements, speed management and roadside protection.

Section 3.12 develops crash-pattern diagnosis through an intersection case study in Weimar, Germany. Small groups analyse assigned crashes in a collision diagram, prepare descriptions and identify common factors and possible contributing circumstances. A whole-group discussion combines their findings into an interpretation of the intersection's safety problems. A further task asks students to find a publicly accessible crash map or database, select a road or intersection near their university or training location, collect the available information, draw collision diagrams and discuss the observed patterns.

Sections 3.13 and 3.14 introduce the evaluation of countermeasure effects using crash rates, crash densities and crash-cost indicators. The lecture illustrates before-and-after comparisons

and explains the need for consistent section boundaries, analysis periods and cost factors, while considering other changes that could influence the results. The practical applies these concepts to a section of the B85 road in the Kyffhäuser mountains, where rumble strips were installed. Students use the supplied crash CSV and traffic-volume information to load the data into GIS, calculate indicators for the comparison periods and estimate the effect of the treatment. The CSV includes georeferenced crash records and attributes describing severity, crash type, road users and environmental conditions.

The workshop in Section 3.15.2 examines how data quality and methodological choices influence the results of reactive assessment. Teams use QGIS and Excel to compare crash-severity filters, analysis periods, segment lengths, spatial buffers and traffic exposure, changing one parameter at a time. They compare crash density and crash rate, consider reference populations and confidence intervals, and discuss changes in risk classification and priority sections. Supporting files include road-network GeoPackages in geographic and projected coordinate systems, a crash-data workbook, the NWA reactive assessment spreadsheet and a Word assessment form. The form guides data checks, indicator calculations, classification, the selection of three priority sections and recommendations for follow-up. Team presentations bring together the results, limitations and implications for assessment reliability.

3.6 Course 3 - Types of didactic and training resources

The supplied Course 3 packages contain 30 teaching files after repeated copies across archives are counted once: 15 PowerPoint presentations (.pptx), 5 Excel workbooks (.xlsx), 2 OpenDocument spreadsheets (.ods), 6 GIS GeoPackages (.gpkg), 1 CSV dataset and 1 Word assessment form (.docx). The presentations comprise 7 lectures, 6 practical or worked-solution presentations and 2 workshops. The ODS files provide raw data and a worked solution, while the Excel, CSV and GIS files support segmentation, crash analysis and risk assessment. ZIP archives are treated as containers and are not counted as additional teaching files.

Course 3 develops the reactive approach to Network-Wide Road Safety Assessment (NWRSA), combining statistical interpretation of recorded crashes with spatial analysis, diagnosis and treatment planning. The teaching materials connect network-level screening with detailed investigation of selected road sections and evaluation of countermeasure effects. They comprise lecture and practical presentations, GIS datasets, crash records, spreadsheet exercises with worked solutions, and workshop resources. The course includes the following forms of teaching and learning:

- lectures covering the accident-based assessment process; segmentation; crash-data quality and allocation; reactive risk indicators and classification; identification of hazardous sections and the Empirical Bayes approach; diagnosis using collision diagrams; countermeasure selection; and before-and-after evaluation,
- guided QGIS practical sessions in which students segment a road, assign traffic data, link crashes to road sections and calculate section attributes. Results are transferred to the NWA reactive spreadsheet tool and returned to QGIS for risk mapping,

- spreadsheet exercises supported by raw data and worked-solution ODS files. Students use road lengths, categories, AADT and crash severity to calculate severity-weighted indicators, compare sections with reference values and identify candidates for further investigation,
- case-based diagnostic and countermeasure exercises using collision diagrams, road photographs and inspection findings. Students identify crash patterns, propose treatments and estimate costs and safety benefits. Worked solutions support feedback; a further task develops independent use of public crash maps or databases,
- an evaluation practical using crash records and traffic information for a treated section of the B85 road in the Kyffhäuser mountains. Students calculate indicators for the comparison periods and interpret changes following the installation of rumble strips,
- a team workshop applying the complete reactive assessment procedure. Students check inputs, calculate crash density and crash rate, assign risk classes, select three priority sections and recommend follow-up actions. The 90-minute analysis is followed by 30 minutes of presentations, supported by an assessment form,
- a methodological workshop testing how severity filters, analysis periods, segment lengths, spatial buffers and traffic exposure affect results. Teams change one parameter at a time, compare classifications and priorities, and discuss uncertainty and the reliability of their recommendations,
- supporting datasets and recording tools, including road-network GeoPackages, route-start and intersection layers, AADT and crash-data workbooks, a crash CSV, the NWA reactive assessment workbook and a Word workshop form. These resources support analysis and documentation of methods, findings and limitations.

Figures 11–16 illustrate selected lecture slides, practical tasks, spreadsheet data and workshop resources used in Course 3. Slide references indicate the slide position in the source presentation.

NWA Reactive methodology
Road Safety Ranking

The following logical conditions are used to determine NWA reactive risk category for each road segment:

- If both the upper and lower intervals for crash rate (or density) are lower than the crash rate (or density) of the reference population, the corresponding road segment is classified as **"low risk"**.
- If the crash rate (or density) of the reference population is between the lower and upper thresholds of the road segment, the corresponding road segment is classified as **"unsure"**.
- If both the upper and lower intervals for crash rate (or density) are higher than the crash rate (or density) of the reference population, the corresponding road segment is classified as **"high risk".**

Figure 11. Lecture slide explaining the criteria for reactive risk classification.
Source: Course 3, Lecture 3.4, Linking accidents to the individual road sections and reactive crash risk assessment, slide 43.

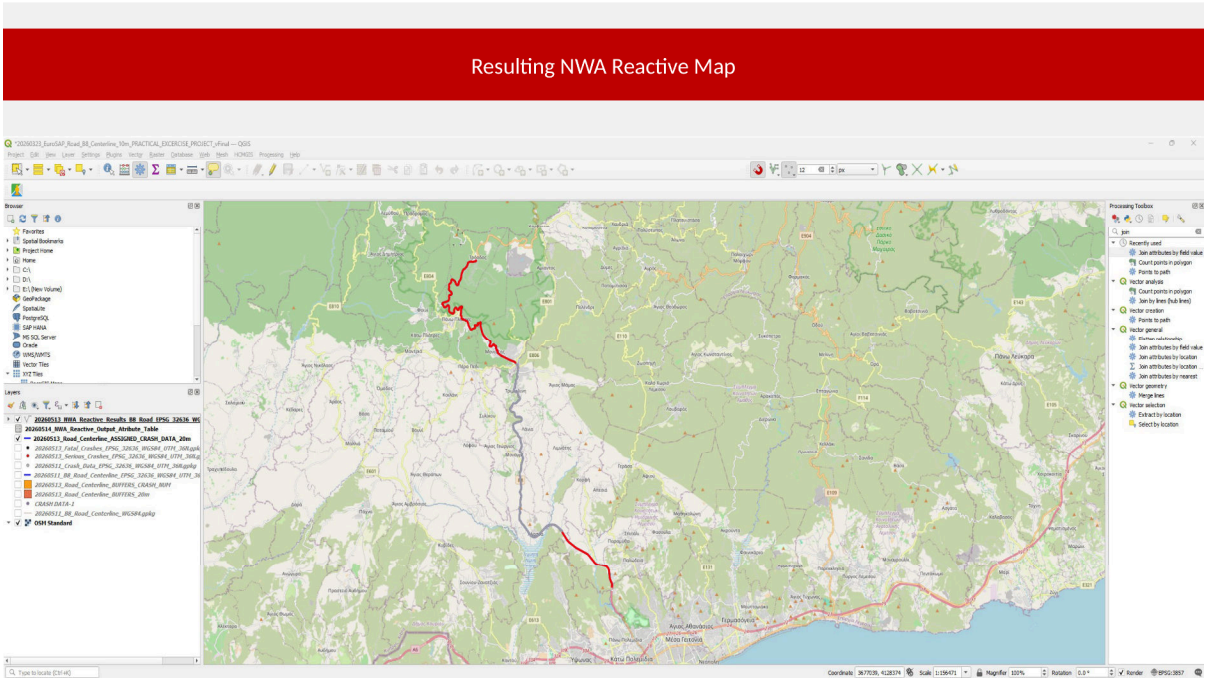


Figure 12. QGIS map presenting the results of the reactive network assessment.
Source: Course 3, Practical 3.5.1, Linking accidents to the individual road sections and reactive crash risk assessment, slide 42.

N of section	Road Nr	Length km	Road Categori	AADT	N of accidents of various severity		
					Fatal	Severe	Slight
1	333	1.9	3	11649		2	3
2	333	3.5	2	3957	1	4	3
3	333	9.6	2	4673			5
4	333	2.4	2	4493			
5	339	1.5	1	2366			
6	339	15.2	1	2833		2	1
7	339	3.7	1	3222		1	2
8	348	5.8	2	6785	1	2	3
9	348	2.2	3	6167	1	1	
10	348	5.6	2	6167	1	1	1

Figure 13. Extract from the raw-data spreadsheet used to identify hazardous road sections.
Source: Course 3, Practical 3.7.1, Raw data for training, worksheet "Raw_data_for_training", cells A2:H13 (headers and the first ten road sections).

Combination of Elements – Example

- Crash report description:

Vehicle 2 travelled on the major road in a northbound direction. At the intersection, vehicle 1, travelling on the minor street, did not obey the stop sign and proceeded on to the major street. Vehicle 2 tried to brake, but it came into a collision with vehicle 1, injuring the driver of vehicle 1 lightly. Road conditions were dry. Time of accident: 22:15

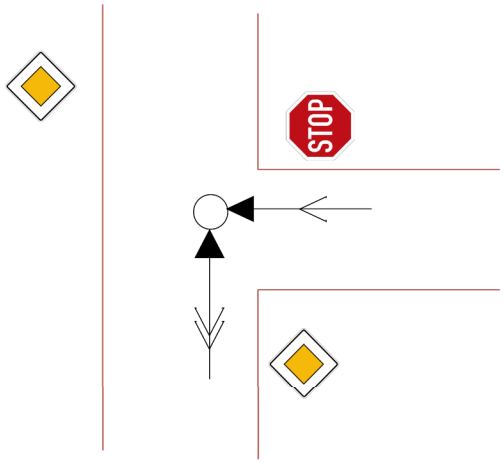
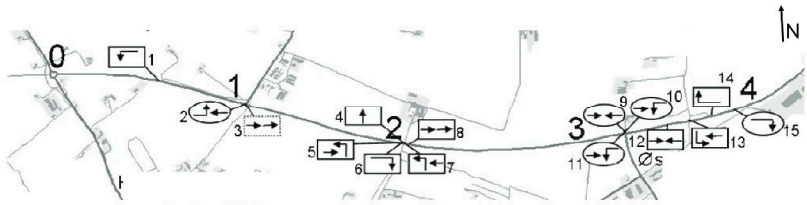


Figure 14. Worked example translating a crash description into a collision diagram.
Source: Course 3, Lecture 3.9, Diagnosis of safety problems and site inspection, slide 21.

Accident diagram of Section X



No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Year	03	03	03	02	03	04	04	04	02	02	04	02	03	03	03
Month	5	9	10	10	9	9	10	10	1	8	5	6	12	10	5
Day	7	1	5	6	2	1	3	1	4	5	5	7	6	6.	6
Hour	6	12	22	02	05	23	11	22	18	10	9	4	11	01	05
Type	012	410	198	031	660	032	650	140	241	410	410	241	660	011	023
Weather	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Rain	Rain	Rain	Dry	Dry	Rai n	Dry
Road	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Wet	Wet	Wet	Dry	Wet	Wet	Wet
Light	L	L	D	D	D	D	L	D	D	L	L	L	L	L	D
Alcohol	Yes	Yes	Yes	Yes	-	Yes	-	-	-	-	-	-	-	-	-

Figure 15. Collision diagram and crash circumstances supplied for the diagnostic practical. Source: Course 3, Practical 3.10.1, Practical training – input data, slide 4.

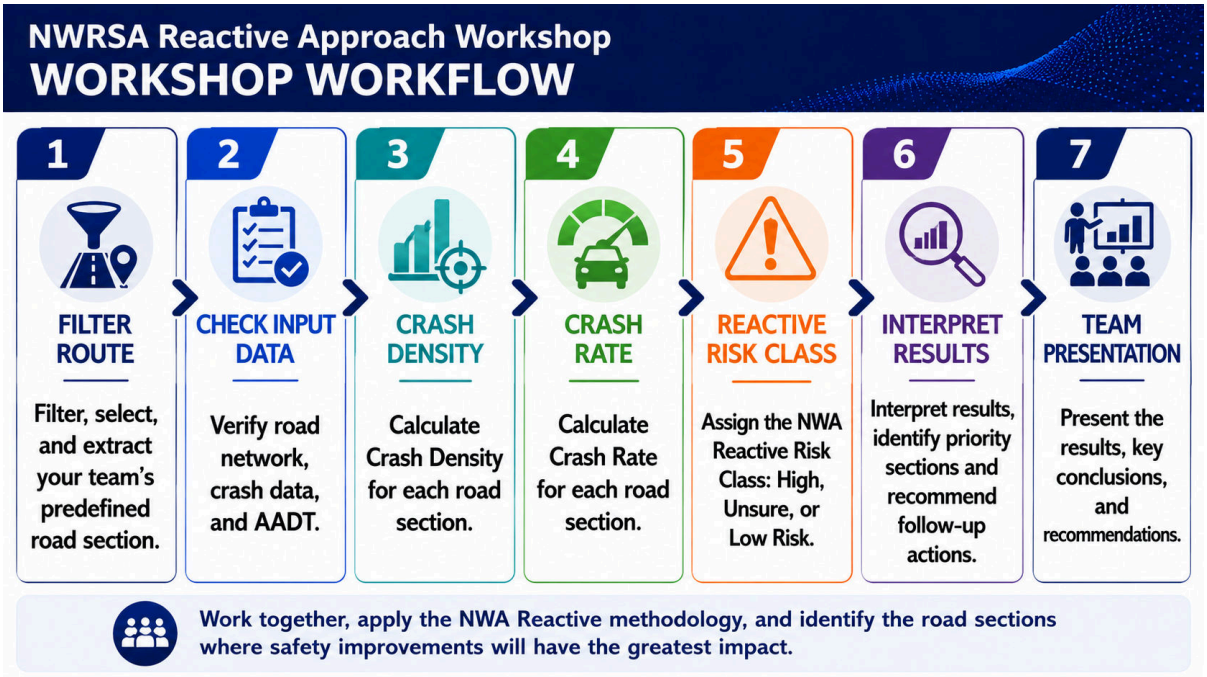


Figure 16. Workshop workflow for applying the reactive NWRSA procedure. Source: Course 3, Workshop 3.8, NWRSA Reactive Approach, slide 4.

3.7 Course 4 - The proactive approach of NWRSA

Course 4 presents the proactive approach to Network-Wide Road Safety Assessment (NWRSA) for motorways and undivided roads. The materials connect infrastructure data collection and inspection with risk assessment, classification and the selection of follow-up

actions. The motorway lectures use a common fictional section, M01, to demonstrate how individual inputs contribute to the assessment result. The undivided-road lectures introduce the Safety Index and the IASP inspection procedure, with support from classification criteria and field examples. Field-activity resources and two team workshops provide opportunities to apply the methods. The supplied files cover Sections 4.1–4.3, 4.5–4.7, 4.9–4.11, 4.13–4.17, 4.19–4.21, 4.23–4.25 and 4.27; no separate files for the intervening section numbers are included.

Section 4.1 introduces the assessment scope, motorway road types and separate assessment of each direction of travel. It distinguishes assessment sections from the auxiliary coding intervals used to record changes in individual infrastructure attributes. Participants examine fixed-length and approximately homogeneous segmentation, boundary placement at ramp gore points, tunnel exclusions and justified exceptions for short sections. Worked examples show how to organise a section register, reconcile lengths and proportions, and retain the sources, dates and uncertainties of the input data.

Section 4.2 addresses traffic and operational characteristics, including directional annual average daily traffic (AADT), vehicle composition, speed limits, operating speeds and V85. Numerical examples illustrate directional traffic allocation, exposure and speed-percentile calculation. The presentation explains the initial motorway proactive classes and the subsequent low-volume filter, including cases where traffic information is missing. Service roads, roadworks, rest areas and intelligent transport systems are considered as operational context or evidence for the relevant model parameter.

Section 4.3 develops the geometric inputs used in motorway assessment. Participants calculate average basic-lane width, apply length weighting where widths vary, and distinguish basic lanes from emergency and auxiliary lanes. Curvature examples combine the radii of the curves with the lengths of each curve within the assessed section. Rural and urban lookup values, measurement conventions, rounding and quality checks are explained. Additional material addresses gradients, vertical alignment and stopping sight distance as issues for engineering investigation beyond the core scoring inputs.

Section 4.5 covers roadside conditions, clear zones and restraint systems. It explains the measurement reference for clear-zone width, obstacle categories and the coding of their longitudinal shares. Tables and worked examples show how to calculate a weighted crash modification factor (CMF) and obtain the roadside reduction factor (RF) by taking its reciprocal. The M01 example and an improvement scenario support the discussion of changes in the index. Photographs and follow-up tasks address barrier continuity, transitions, terminals and isolated hazards that require attention alongside the section-level result.

Section 4.6 explains how bridges, tunnels and their approaches are recorded within the assessment framework. Examples distinguish included road sections from excluded tunnel intervals, show the implications of boundaries for lengths and parameter shares, and illustrate structure registers. The materials connect observations at bridge and tunnel interfaces with the responsibilities of road, structure and tunnel specialists. Separately labelled Polish examples

distinguish national provisions from the European Handbook methodology used in the main course calculations.

Section 4.7 focuses on interchanges and spacing between successive ramp gore points. Diagrams, aerial imagery, and tables explain directional measurement, the selection of rural and urban factors, and the aggregation rules for long and short sections. Worked calculations use the common M01 section and additional examples from the Handbook. Exercises test the influence of a changed spacing and the correct treatment of short sections. The presentation also discusses calculator lookup checks and separates the network model from a detailed investigation of weaving, visibility, channelisation, and merge-or-diverge conditions.

Section 4.9 addresses maintenance- and safety-relevant conditions, including pavement defects, drainage, signs, markings, delineation, and damaged restraint systems. Photographs illustrate the evidence that can be recorded visually and the limitations of inferring friction or system performance from images. Example registers and exercises guide participants from locating a defect and describing its safety mechanism to identifying missing evidence, assigning a response and documenting completion. Maintenance findings are considered alongside the six-factor motorway assessment, without introducing an additional scoring factor.

Section 4.10 examines vulnerable road users and facilities at motorway interfaces. It distinguishes fully protected or grade-separated pedestrian and cycle routes from potential conflicts with vehicles, particularly at ramps. Worked cases demonstrate the application of the pedestrian and cyclist parameters and their contribution to the section score. Participants assess the evidence needed to confirm protection, examine alternative routes and discuss follow-up needs. Motorcyclist safety is addressed as a wider inspection issue, with a clear distinction from the pedestrian and cyclist scoring parameter.

Section 4.11 covers incident monitoring and response systems. It explains the operational mechanism and verified service coverage required for the operational characteristics parameter, distinguishing these from equipment counts or performance measures. Diagrams and worked cases connect detection, verification, road-user information and response coordination. Exercises address coding decisions, evidence records and incident timelines, while supplementary material considers service improvement and explicitly labelled Polish calculation forms.

Section 4.13 provides field-activity instructions and supporting motorway materials. A field recording manual, supplied in Word and PDF formats, describes site identification, team roles, equipment, road inventory, crash and exposure data, matched comparison sites, before-and-after periods, photographic evidence and quality control for local CMF studies. Its accompanying presentation adds motorway tasks using prepared maps, referenced video and supplied GIS resources. Participants define a section, code visible attributes, document uncertainty and identify the official safety data needed for further analysis. The S7 presentation introduces the prepared Polish expressway examples, while a separate 14-page PDF supplies section maps. The classroom workflow can be completed using existing recordings; any additional site visit follows a separate safety plan.

The GIS package for Section 4.13 contains two Shapefile datasets and two corresponding KMZ files: S7 section routes and chainage points at 100 m intervals. Fourteen PNG maps complement the previously supplied PDF map collection. These resources support section location, alignment of observations with chainage, mapping and the use of stable section identifiers. Each Shapefile is supplied with the attribute, projection, indexing and metadata files needed to use the layer.

Section 4.14 provides a motorway workshop organised for teams of five to ten participants, with 90 minutes for analysis and a ten-minute presentation per team. Participants verify the assigned section, collect the six motorway parameter inputs, determine reduction factors, calculate the proactive safety score and identify its risk class. They interpret the factors contributing to the result, propose engineering measures and identify additional evidence that would improve the assessment. The supplied input package includes two GeoPackages, a motorway coding workbook, the NWA-proactive calculation workbook and an editable Word assessment form. Participants use these resources to document the analysis and prepare their team presentation.

The motorway coding workbook contains an Input_Data worksheet for section identifiers, road and carriageway, observation side, roadside objects, clear-zone width, interval limits, lengths, percentage shares and links to visual evidence. Example entries and formulas illustrate the organisation of roadside observations before parameter calculation. The NWA-proactive tool contains assessment worksheets for rural and urban motorways, primary undivided roads and primary divided roads, together with lookup tables and data-validation lists. Participants select the worksheet appropriate to the assigned road type.

Section 4.15 introduces proactive data collection for undivided rural roads through the Safety Index and the IASP safety inspection procedure. The lecture relates the index to exposure, crash frequency and severity and explains the use of structured checklists for 200 m segments. It distinguishes front-seat and back-seat inspection responsibilities, high- and low-level problems, and observations that must be made during inspection from elements that may also be assessed from video. Checklist images and examples support consistent coding and discussion of inspection reliability.

Sections 4.16 and 4.17 address road context, traffic and geometric characteristics on undivided roads. Topics include road function, land use, property access, roadworks, parking, motorised traffic and pedestrian and cyclist movements along and across the road. Speed limits, operating speeds and speed management are related to the assessment context. Geometric material covers lane and shoulder widths, pedestrian and cycle facilities, horizontal and vertical alignment, design consistency and sight distance. Classification criteria and photographic examples illustrate how to identify problems and their connection to the risk-index components.
Sections 4.19 and 4.20 examine roadside hazards, restraint systems, bridges and tunnels. Classification criteria and field photographs cover embankments, ditches, trees, poles, other fixed obstacles, bridge barriers, terminals and transitions. The bridge and tunnel lecture extends the descriptive inventory to structure location, dimensions, restrictions, equipment and visible warning signs. It distinguishes road-safety observations from specialist structural

assessment and explains that the current IASP checklists address bridge protection details rather than a complete structural or tunnel assessment.

Section 4.21 describes interchanges, intersections and roundabouts in terms of junction type, arms, traffic control, protected turns, channelisation, quality, and intersecting traffic volumes. Section 4.23 applies classification criteria and photographic examples to safety-relevant pavement defects, surface condition, signs, markings, chevrons, guideposts and reflectors, with additional discussion of shoulders, vegetation and restraint-system condition. Section 4.24 considers pedestrian and cycle crossings, grade separation, fencing, sidewalks, cycling facilities, minor-road arms and alternative routes. The junction and vulnerable-road-user lectures explicitly identify the limits of the current IASP procedure and discuss possible extensions; these topics should not be interpreted as already incorporated into its existing checklists.

Section 4.25 provides field-activity instructions and a classroom exercise for undivided roads. One presentation addresses section selection, recording equipment and safe observation. A second introduces prepared material for 20 national roads and 21 regional roads. It explains how to select and map a section, match video to its chainage and assess roadside, alignment and access issues in 200 m segments. Participants prepare a coded inventory, an evidence log and an English presentation. Local crash and exposure data are included where available, while regional statistics provide context and are kept separate from section-level crash records.

The GIS package for Section 4.25 provides separate collections of national and regional roads. Each collection contains a route layer and a chainage-point layer in both Shapefile and KMZ formats, together with a PDF map atlas. The national road atlas has 22 pages, and the regional road atlas has 23 pages. These resources allow participants to locate the assigned section, relate video observations to spatial reference points and present the coded inventory on a map.

Section 4.27 provides a workshop for teams of 5 to 10 participants, with 90 minutes for analysis and a 10-minute presentation per team. Participants verify an undivided-road section, code infrastructure attributes, select reduction factors, calculate the proactive score and determine its risk class. They identify deficiencies, propose engineering responses and state evidence gaps. The supplied input package contains two GeoPackages, the NWA-proactive Excel workbook and a dedicated Word assessment form.

The workshop GeoPackages contain road-network line features with section codes, road numbers, area type, carriageway, AADT and coordinate attributes. Each supplied layer has 308 features. The identical network files supplied with both workshops allow teams to select their assigned sections from a shared input network. Both file variants declare EPSG:4326 in their internal layer metadata, including the variant named EPSG_32636_WGS84_UTM_36N; the coordinate reference system therefore needs to be checked before distance-based analysis.

Two separate Word assessment forms support the motorway and undivided-road workshops. Each record includes participant, team, date, and section information, followed by 10 tasks

with space for results, comments, and recommendations, and a final summary. The forms guide input verification, infrastructure coding, factor calculation, score and risk-class determination, identification of contributing deficiencies, countermeasure proposals and documentation of additional data needs.

3.8 Course 4 - Types of didactic and training resources

Across the six supplied archives, Course 4 contains 23 PowerPoint presentations (.pptx; 500 slides), 3 Excel files (.xlsx), 3 Word documents (.docx), 4 PDF documents, 4 GeoPackage files (.gpkg), 6 KMZ files, 6 complete Shapefile datasets and 14 PNG maps. The presentations comprise 17 lectures, 4 field activity presentations, and 2 workshops. The Word documents comprise the field recording manual and two workshop assessment forms; the PDFs comprise the manual and three map collections for S7, national roads and regional roads.

These counts describe the supplied files by format, with each Shapefile and its companion files treated as one dataset. The two workshop archives repeat the same pair of GeoPackages, so there are 2 distinct GeoPackage files among the 4 supplied copies. The two NWA-proactive calculator files have identical worksheet names, cell values and formulas; together with the separate motorway coding workbook, they represent 2 workbook resources supplied as 3 Excel files. The field manual is supplied in both Word and PDF formats. ZIP containers and Shapefile companion files are not counted as additional teaching resources. Video recordings remain referenced external resources; no standalone video files are included.

The materials combine motorway assessment calculations with inspection-based teaching for undivided roads, supported by field manuals, maps, visual examples and team tasks. The following forms of teaching and learning are supported:

- lecture presentations explaining assessment scope, data requirements, motorway parameter calculations and classification, alongside the Safety Index, IASP inspection procedure and topic-specific criteria for undivided roads,
- worked motorway calculations using the fictional M01 section and additional cases, illustrating length weighting, factor selection, aggregation and the effect of changed inputs; undivided-road examples support the classification of observed safety problems,
- editable diagrams, process descriptions, reference tables and embedded checklist examples illustrating section boundaries, infrastructure measurement, inspection responsibilities and coding conventions,
- photographic, aerial and mapped examples showing road geometry, roadside hazards, maintenance defects, junction features and protection arrangements, with context for interpreting the available evidence,
- embedded exercises, discussion prompts and advanced application tasks requiring participants to justify coding decisions, check calculations, identify missing information and distinguish screening results from further investigation needs,
- example evidence records and inspection checklists presented within the teaching materials, supporting consistent documentation of road features, sources, uncertainties, responsibilities and follow-up actions,
- four field-activity presentations guiding section selection, safe recording and classroom review of prepared road imagery, supported by supplied section maps, route and

chainage layers in Shapefile and KMZ formats, and referenced video recordings; individual inventories, evidence logs and presentations are the expected outputs,

- a field recording manual in editable Word and PDF formats, describing the collection and quality assurance of site, crash, exposure and photographic data for local CMF studies and subsequent proactive analysis; PDF map collections cover S7, national and regional roads, while 14 separate PNG files provide S7 section maps,
- two workshop presentations, one for motorways and one for undivided roads, supported by GeoPackage network layers, Excel calculation resources and editable Word assessment forms; the tasks cover input verification, coding, scoring, interpretation, countermeasure proposals and team presentation of findings,
- Excel resources comprising a motorway roadside-coding workbook and the NWA-proactive calculation tool supplied with both workshops, enabling participants to organise observations, select the relevant road-type model and calculate assessment factors and scores,
- editable motorway and undivided-road workshop forms providing ten structured tasks and a concluding summary, with fields for results, comments and recommendations.

Figures 17–22 illustrate selected methodological, calculation, practical-task and workshop materials used in Course 4. Slide references indicate positions in the source presentations.

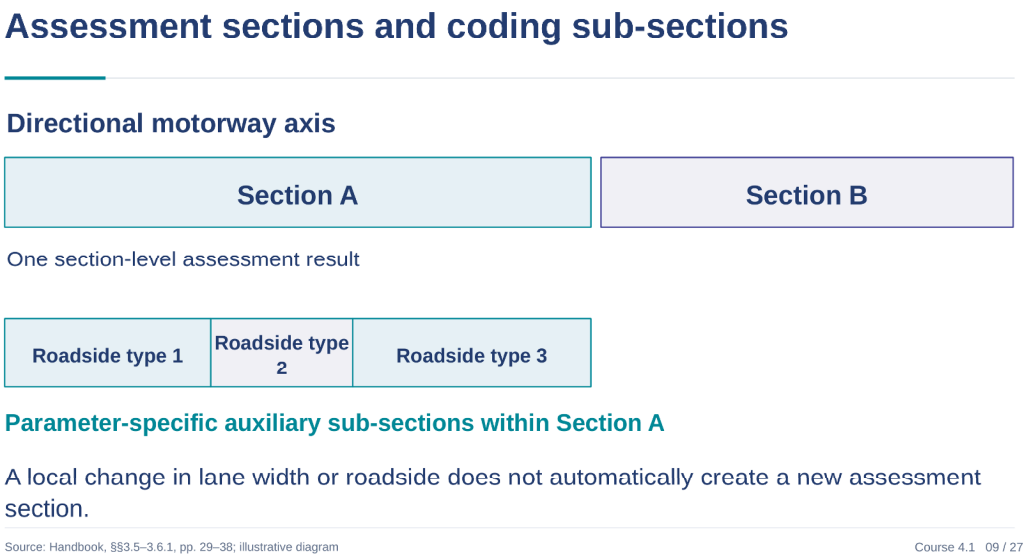


Figure 17. Assessment sections and parameter-specific auxiliary coding intervals. Source: Course 4, presentation 4.1, Data collection and section definition, slide 9.

Case M01: weighted roadside factor

Worked example

Configuration	Share × CMF	Contribution
No relevant obstacle	0.30 × 1.000	0.300
Concrete barrier	0.20 × 1.016	0.203
Rigid obstacles; CZ = 6 m	0.25 × 1.742	0.435
Rigid obstacles; CZ = 8 m	0.25 × 1.701	0.425

CMF(RS) = 1.364 **RF(RS) = 1 / 1.364 = 0.733**

Fictional teaching case M01. Method: NWA Handbook (2023).

Course 4.5 18 / 30

Figure 18. Worked on the calculation of the weighted roadside factor for the fictional M01 section. Source: Course 4, presentation 4.5, Roadside, clear zones and restraint systems, slide 18.

Case M01: ramp-spacing calculation

Worked example

Relevant pair	Spacing	Rural CMF
G1–G2	800 m	1.088
G2–G3	1,200 m	1.057
G3–G4	900 m	1.077
Remaining contribution	4 km − 3 km	1.000

CMF(IC) = (1.088 + 1.057 + 1.077 + 1.000) / 4 = 1.056

RF(IC) = 1 / 1.056 = 0.947

Fictional teaching case M01. Method: NWA Handbook (2023).

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Figure 19. Worked on the ramp-spacing calculation for the fictional M01 section. Source: Course 4, presentation 4.7, Interchanges and ramp spacing, slide 19.

Exercise: a complete action record

01

Choose one issue from the case and state its road-user mechanism

02

Specify the missing evidence and a competent owner

03

Define the proposed response and the completion evidence

04

Explain whether the NWA input record also needs an update

Illustrative exercise; proposed implementation

Course 4.9 23 / 26

Figure 20. Exercise guiding the preparation of a complete maintenance action record.
Source: Course 4, presentation 4.9, Maintenance and safety-relevant condition, slide 23.



Figure 21. Workflow for the motorway proactive assessment workshop.
Source: Course 4, 4.14.1, Workshop Proactive analysis of NWRSA Motorways, slide 4.



Figure 22. Workflow for the undivided-road proactive assessment workshop.
Source: Course 4, 4.27.1, Workshop Proactive analysis of NWRSA Undivided Roads, slide 4.

3.9 Course 5 - Integration of selected activities using proactive and reactive methods

Course 5 explains how reactive and proactive Network-Wide Road Safety Assessment (NWRSA) results are combined to identify priorities for safety improvement. It links crash-based evidence with infrastructure-based assessment through an integration matrix, harmonised segmentation and mapping. The package comprises a lecture, a practical session and a workshop, supported by an Excel workbook, two GeoPackages and a Word assessment form.

Section 5.1 introduces the NWA integrated methodology and its five priority classes, ranging from very low to very high priority. The lecture explains how the integration matrix combines reactive and proactive classifications and how to interpret agreement or differences between the two assessments. It addresses cases where crash risk and infrastructure quality yield different conclusions, and explains that changes in the boundaries of either assessment require corresponding changes to the integrated segmentation. It also introduces conversion of iRAP results to the EC NWA framework and further prioritisation within a class using traffic volumes, casualties or other indicators. Follow-up actions include targeted road safety inspections, identification of countermeasures and the selection, design and implementation of treatments.

Section 5.2 translates the methodology into an Excel and QGIS workflow for the B8 road. Students define named ranges for reactive classes, proactive classes and the integration matrix, then use nested XLOOKUP formulas to calculate integrated priorities separately for crash-density-based and crash-rate-based results. The exercise also introduces normalised crash-rate and proactive-score variables, as well as a Priority Index, to distinguish sections within the same integrated class. After exporting the table to CSV, students load the coordinates into QGIS, create road centrelines from 10-metre points, join the assessment attributes, save the layers as GeoPackages and apply suitable map symbology. The final maps show integrated priorities and the critical section selected using the Priority Index.

The practical workbook contains a road dataset with coordinates, section identifiers, lengths and chainage, road and traffic attributes, crash counts and confidence limits, infrastructure risk factors, crash rates, proactive scores and the existing reactive and proactive classifications. A separate INTEGRATION_MATRIX worksheet supplies the lookup table used in the calculations. These resources allow students to connect the numerical classification with its spatial representation and distinguish the integrated priority class from the additional within-class ranking.

Section 5.3 consolidates learning through a team workshop. One team assesses A roads (motorways), while the other assesses B roads (primary roads). Students check the completeness and linkage of the input assessments, harmonise segmentation where necessary, apply the integration matrix and prepare an integrated priority map. They identify high- and very-high-priority sections, compare reactive and proactive results, explain differences and refine priorities using additional evidence. The workshop concludes with recommendations for targeted inspections and other follow-up actions, documented in an assessment form and presented to the group.

The workshop input package provides two GeoPackages with road geometry, traffic and crash information, confidence limits and assessment results. A Word form provides ten tasks with fields for results, comments and recommendations, followed by a summary. It supports input verification, selection of sections for targeted inspection and proposed safety improvements.

3.10 Course 5 - Types of didactic and training resources

The supplied Course 5 package contains 7 teaching files: 3 PowerPoint presentations (.pptx), 1 Excel workbook (.xlsx), 2 GIS GeoPackages (.gpkg) and 1 Word assessment form (.docx). The presentations comprise 1 lecture, 1 guided practical and 1 workshop. The Excel workbook contains the road dataset and integration matrix; the GeoPackages provide the workshop network data; and the Word form records the results and recommendations. The two internal ZIP archives are containers for these resources and are not counted as additional teaching files.

Course 5 combines methodological explanations with software-based analysis and collaborative interpretation of assessment results. The resources support the integration of crash-based and infrastructure-based evidence, the mapping of priorities and the preparation of recommendations for follow-up. The course includes the following forms of teaching and learning:

- a lecture presentation explaining the integration matrix, five priority classes, interpretation of reactive and proactive results, segmentation harmonisation, conversion of iRAP results and the relationship between network assessment and subsequent inspection and treatment planning,
- a guided practical presentation with step-by-step Excel and QGIS instructions. Students calculate integrated classifications using named ranges and lookup formulas, derive a Priority Index, export and join data, construct road centrelines and prepare maps of priority and critical sections,
- an Excel input workbook containing the B8 road data and a separate integration-matrix worksheet. Coordinates, road attributes, traffic and crash indicators, infrastructure risk factors and assessment classes support calculation, comparison and mapping,
- a team workshop using assigned motorway and primary road networks to apply the integrated approach. Students verify the inputs, compare the two assessments, identify priority sections, justify targeted inspections and present their conclusions and proposed follow-up actions,
- supporting GIS datasets containing road geometry and reactive and proactive assessment attributes, enabling filtering, spatial joins, visualisation and selection of sections for further analysis,
- an editable Word assessment form organising the workshop into ten tasks and a concluding summary. Fields for results, comments and recommendations support consistent reporting of the analyses and the justification of decisions.

Figures 23–26 illustrate selected lecture, practical and workshop materials used in Course 5. Slide references indicate positions in the source presentations.

PROACTIVE ASSESSMENT RESULTS	REACTIVE ASSESSMENT RESULTS: High Risk (class r3)	Unsure (class r2)	No Data	Low Priority (class r1)
High Risk (class p3)	Very High Priority (class 5)	High Priority (class 4)	High Priority (class 4)	Low Priority (class 2)
Intermediate Risk (class p2)	Very High Priority (class 5)	Intermediate Priority (class 3)	Intermediate Priority (class 3)	Low Priority (class 2)
Low Priority (class p1)	Very High Priority (class 5)	Low Priority (class 2)	Very Low Priority (class 1)	Very Low Priority (class 1)

Figure 23. Integration matrix combining reactive and proactive NWA results.
Source: Course 5, Lecture 5.1, Methodology of proactive and reactive activities integration, slide 7 (extract).

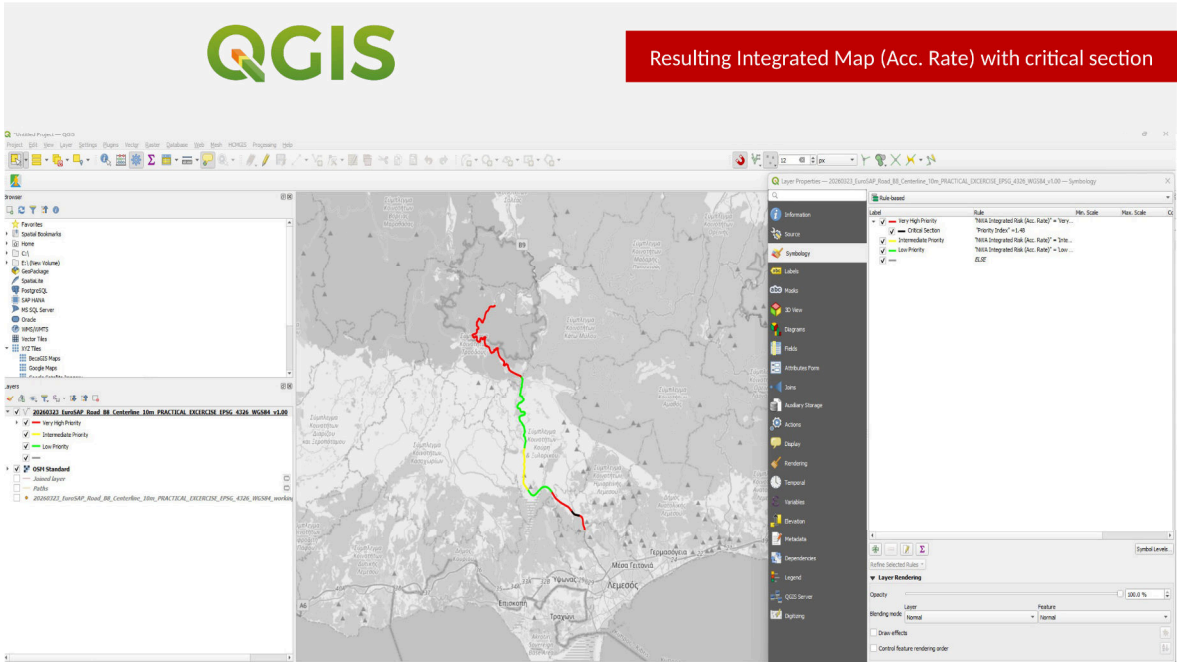


Figure 24. QGIS example showing integrated priorities and a critical section.
Source: Course 5, Practical 5.2.1, Integrated analysis of NWRSA, slide 28.

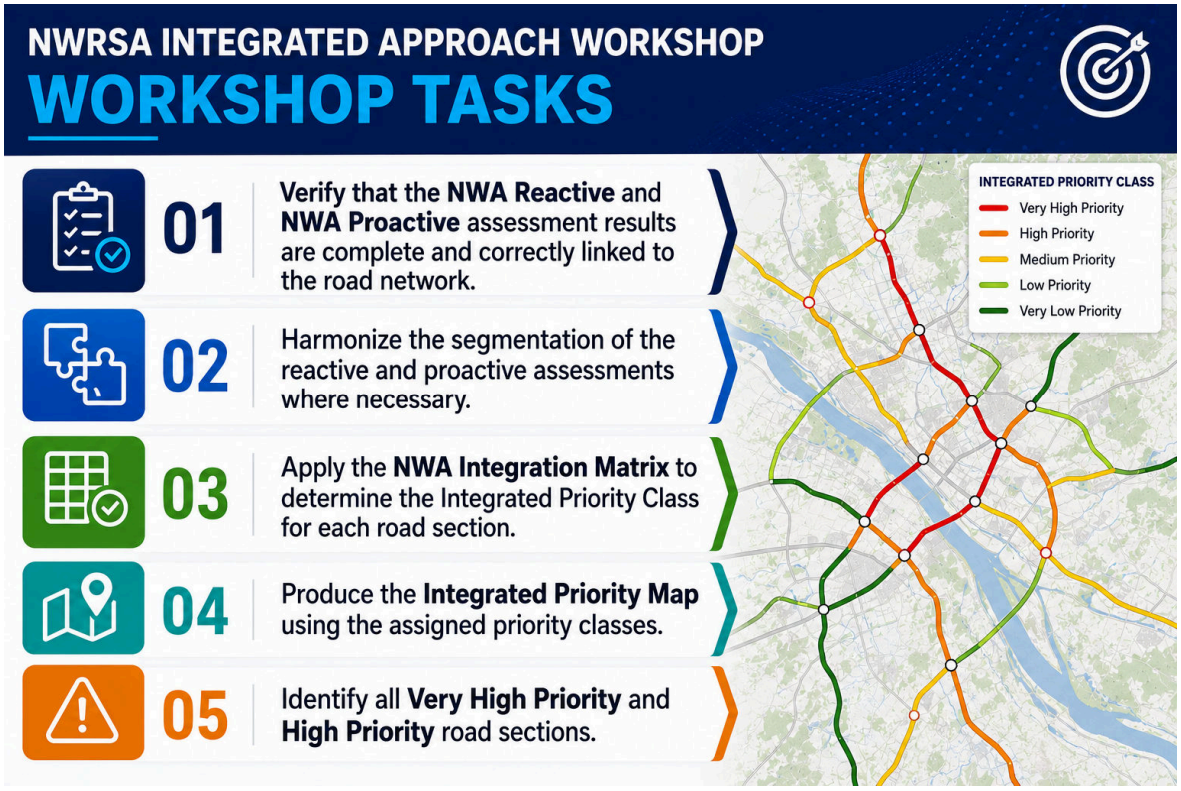


Figure 25. Workshop tasks for checking inputs, integrating results and identifying priority sections. Source: Course 5, Workshop 5.3.1, NWRSA Integrated Approach, slide 5.

ID	Task	Results/Comments/Recommendations
5.	Identify all Very High Priority and High Priority road sections.	
6.	Compare the reactive and proactive assessment results. Which road sections have consistent results and which show significant differences?	

Figure 26. Assessment-form extract for recording priority sections and comparing reactive and proactive results. Source: Course 5, resource 5.3.2.1, Integrated Approach Workshop Form, p. 2, tasks 5–6 (extract).

3.11 Course 6 - Reporting, dissemination and follow-up of NWRSA

Course 6 addresses the communication and practical use of Network-Wide Road Safety Assessment (NWRSA) results. It connects reporting and dissemination with targeted inspection, the development and appraisal of countermeasures, programme selection and monitoring. Two lectures and two practical presentations guide participants from explaining assessment findings to different audiences to preparing a reasoned follow-up decision. Fictional networks, the recurring motorway case M01 and illustrative investment scenarios provide the basis for the exercises.

Section 6.1 introduces dissemination, implementation and reporting. The lecture explains how network-wide assessment can inform resource allocation, motivate stakeholders and communicate infrastructure safety to road users. It organises effective communication around the target group, message, and medium, distinguishing among the needs of research partners, public authorities, politicians, other stakeholders, and the public. Examples include reports, factsheets, maps, interactive applications and social media. The German Accident Atlas, the Polish Road Safety Observatory and the iRAP Star Rating Demonstrator illustrate different ways of presenting safety information. The presentation also introduces the Directive's provisions on publication, transparency, safety categories, and voluntary reporting.

Section 6.2 applies these communication principles to a fictional road network. Participants receive a network diagram, link distances and a table and map of the initial NWRSA classes, then prepare a short report and a press statement. A second task presents a reassessment five years after a programme of safety works and asks participants to report the improvement and the current condition of the network. The exercise develops interpretation of spatial and tabular results and the ability to adapt the same evidence to technical reporting and public communication. The network diagrams and before-and-after summaries are embedded in the presentation.

Section 6.3 explains how integrated NWRSA results lead to follow-up investigation and action. The lecture revisits the integration matrix, compatible spatial boundaries and the interpretation of priority classes, then distinguishes targeted inspection from direct remedial action. Participants consider how to formulate an inspection question, define its scope, assemble evidence and identify the competent team. Photographic examples support the discussion of the differences between an observation, a plausible collision mechanism, and the additional information needed before selecting a remedy. Further material addresses the development of countermeasure options and the recording of a reasoned decision.

The second part of Section 6.3 introduces economic appraisal and prioritisation. The M01 example links infrastructure scoring and integrated classification to a separate, explicitly assumed treatment-effect and economic scenario. The lecture distinguishes a change in the NWA index from an estimate of crashes prevented. Worked calculations cover expected safety benefits, their monetary valuation, discounting, economic net present value (ENPV) and benefit–cost ratio (BCR), with stated assumptions for the appraisal period, operating and maintenance costs and residual value. A constrained-budget example compares feasible project combinations and illustrates why selecting the individual project with the highest BCR

does not necessarily maximise programme ENPV. Sensitivity analysis, action planning, implementation verification and safety-effect evaluation complete the lecture.

Section 6.4 provides a practical exercise with a 45-minute core working plan. Teams classify five fictional sections using the integration matrix, identify follow-up priorities and prepare an inspection question based on a reference photograph. An editable table on a slide records the observation, possible safety mechanism, evidence gap, responsible team and any immediate management need. Participants then appraise three candidate projects using the supplied costs, annual benefits, maintenance costs, ten-year horizon and assumed discount rate. They calculate present values, ENPV, and BCR, compare feasible programmes under a capital-budget constraint, and test how a reduction in one project's annual benefit affects the preferred choice.

Additional tasks in Section 6.4 return to M01, providing geometric, roadside and operational inputs for calculating motorway factors, the proactive score and the integrated class. Advanced variants change incident information provision, pedestrian-and-cyclist conflict conditions, or roadside treatment. Debrief slides supply worked solutions for classification, economic appraisal, programme choice, sensitivity and M01 calculations. The exercise ends with a structured action record and an instructor rubric worth ten points, covering classification, inspection reasoning, reproducible arithmetic, programme selection and traceable decisions. The data, monetary values and scenarios are explicitly presented as teaching examples.

3.12 Course 6 - Types of didactic and training resources

The supplied Course 6 materials contain 4 PowerPoint presentations (.pptx), comprising 99 slides: 2 lectures with 23 and 39 slides and 2 practical presentations with 9 and 28 slides. No separate Excel workbooks, Word forms, PDF documents or GIS datasets are included in this set. The numerical inputs, network diagrams, reporting tasks, editable exercise tables, worked solutions and assessment rubric are embedded in the presentations. Referenced websites and publications support the teaching but are not additional supplied files.

Course 6 combines audience-oriented communication with evidence-based follow-up decisions and illustrative economic calculations. The resources support the following forms of teaching and learning:

- lecture presentations explaining how to communicate assessment results, select suitable messages and media, interpret integrated priorities and develop inspection, appraisal and implementation decisions,
- a reporting practical based on a fictional network, including link distances, maps and tables of assessment classes before and after a safety programme; participants prepare technical reports and public-facing statements,
- worked numerical examples connecting the M01 assessment with separate treatment-effect assumptions and discounted economic indicators, supported by project-combination and sensitivity comparisons,
- a team practical with a timed workflow, classification tasks, a photographic inspection prompt, project appraisal inputs and editable tables for recording calculations and decisions,

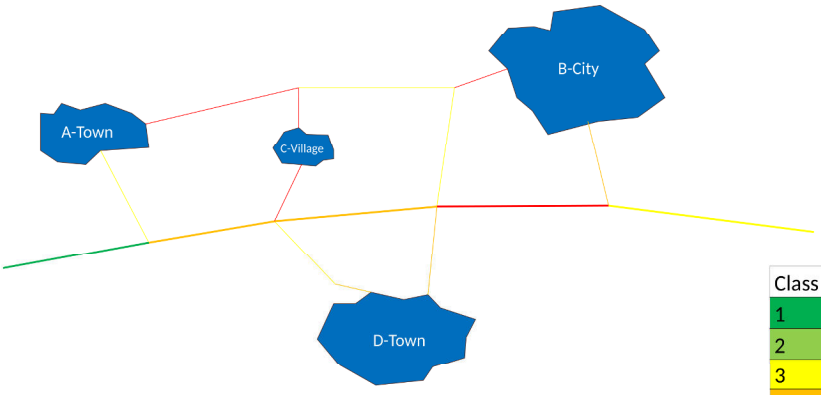
- debrief slides containing worked solutions and advanced M01 variants, enabling participants to check their calculations, compare interpretations and explain the limits of the results,
- action-record templates and a ten-point instructor rubric embedded in the practical presentation, supporting the assessment of reasoning, calculation quality, feasible choices and accountability.

Figures 27–30 illustrate selected communication, reporting, appraisal and practical-exercise materials used in Course 6. Slide references indicate positions in the source presentations.



Figure 27. Examples of communication media for presenting assessment results. Source: Course 6, Lecture 6.1, Dissemination, Implementation and Reporting, slide 11.

BEFORE

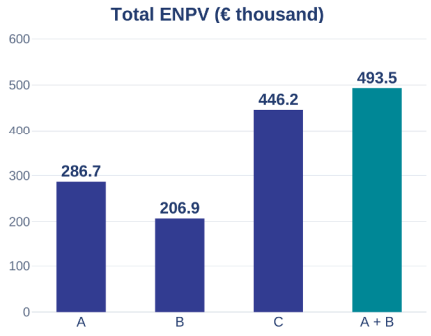


Class	Sections	Length
1	1	12 km
2	0	0 km
3	5	45 km
4	5	26 km
5	5	30 km

Figure 28. Initial assessment map and class summary for the fictional reporting exercise. Source: Course 6, Practical 6.2, Reporting and Dissemination – practical application, slide 6.

Why the highest BCR is not always the programme

Feasible programme	Initial cost (€k)	Total ENPV (€k)
A	200	286.7
B	150	206.9
C	300	446.2
A + B	350	493.5
A + C / B + C	500 / 450	Outside the €400k budget



Under these assumptions, A + B gives greater total ENPV than C.

Illustrative portfolio, complete feasible-combination comparison

Course 6.3 35 / 39

Figure 29. Comparison of feasible programmes under a capital-budget constraint. Source: Course 6, Lecture 6.3, Follow-up, prioritisation and appraisal, slide 35.

Assessment rubric

Criterion	Points	Evidence
Correct integrated classification	**2**	All five matrix decisions
Focused inspection question	**2**	Observation, mechanism and data gap
Reproducible economic arithmetic	**2**	PV, ENPV, BCR and units
Feasible and reasoned programme	**2**	All combinations and sensitivity
Traceable action record	**2**	Owner, rationale and verification

Proposed instructor rubric, 10 points

Course 6.4 27 / 28

Figure 30. Instructor rubric for the follow-up practical exercise.
Source: Course 6, Practical 6.4, Follow-up of NWRSA: practical exercise, slide 27.

4 ADDITIONAL TRAINING MATERIALS FOR QGIS

The supplementary English-language QGIS tutorial helps participants develop the basic GIS skills needed for the practical road safety assessment exercises. It introduces spatial data and the QGIS interface, data acquisition from OpenStreetMap, coordinate reference systems and map symbology.

4.1 Training content

The tutorial covers attribute and spatial selection, buffering, clipping, point layer creation and shortest-path analysis. Practical tasks include downloading data around the Arc de Triomphe in Paris with the QuickOSM plugin and applying shared QML styles to OpenStreetMap data.

4.2 Types of didactic materials

The supplied file, Practical_Tutorial_QGIS_basic_en.pptx, contains one PowerPoint presentation with 24 slides. It combines links to external video tutorials with knowledge-check questions, practical task instructions and illustrated examples, supporting both guided training and individual practice.

These supplementary materials can be used for preparatory study or guided practice alongside the six main courses. They are in addition to the 120 teaching hours listed in the timetable; no separate duration is specified for the QGIS tutorial.

5 MOODLE E-LEARNING PLATFORM

5.1 Moodle at Gdansk University of Technology

Moodle is a learning management system that enables educators to create online courses, organise resources into modules, support communication between teachers and learners, and monitor learner progress. The e-learning environment of Gdansk University of Technology (GUT) supports both fully remote learning and blended learning, in which online study complements in-person classes. Courses can be accessed through web browsers and mobile applications.

For EuroS@P-NWRSA, the GUT Moodle environment provides the online access point for the new course set and its associated didactic materials. The course spaces follow the structured online delivery model described in the earlier EuroS@P platform and didactic materials reports.

5.2 Course access and registration

The EuroS@P-NWRSA course page is available at the GUT Moodle course page. Course materials are available after sign-in. Registration and platform-access instructions are provided in the GUT e-learning access guide.

The direct course page may require a GUT e-learning account. Users should follow the access guide if they do not yet have access to the platform.

Course access step-by-step:

- Access to the Portal: Open your web browser and navigate to https://enauczanie.pg.edu.pl/2025
- Create account: If accessing for the first time, locate the "Haven't got Gdańsk Tech account?" section and click the "Log in using local account" button.
- Registration: Complete the electronic form using your institutional email address, set up a secure password, and confirm your identity via the activation link sent to your inbox.
- Login to e-nauczanie: Select the "Log in using local account" option, then enter your username and password.
- Course Enrollment: Once logged in with your new local credentials, you can access the courses directly via the provided links or by navigating to the "Main page" and typing "EUROS@P" into the course search bar
- Course Access: Once you have successfully enrolled in the courses, they will permanently appear in your personal "My courses" section for quick access.

5.3 Video resources

Video resources complement the online courses. The EuroS@P channel provides one playlist for the current NWRSA material. Additional videos used in the project are available on the separate Infro@d – European Digital Education channel.

5.3.1 EuroS@P YouTube channel

The EuroS@P YouTube channel is accessible at youtube.com/@eurosp4658.

Table 2. EuroS@P YouTube channel playlist

Channel	Playlist for this material
EuroS@P	EuroSaP NWRSA - S7 Road sections

5.3.2 Infro@d – European Digital Education

The Infro@d YouTube channel is accessible at: youtube.com/@Infrod-EuropeanDigitalEducatio.

Table 3. Infro@d YouTube channel playlists

Channel	Playlists used in the project
Infro@d – European Digital Education	INFRO@D Roadside safety management - National Roads
Infro@d – European Digital Education	INFRO@D Roadside safety management - Regional Roads