

Transport infrastructure in the Danube region – **ROAD LINKS**

Slovenko Henigman
Metod Di Batista

Bled, May 15th 2018

Content

- Introduction
- Basic info about the Danube region and roads
- Traffic and safety
- Data about investments and maintenance
- TEN-T corridors and bottlenecks
- PMS
- Main goals and measures on roads in Danube region
- Further development
- Conclusion
- Debate

Introduction

The Danube region includes 14 countries (18 countries, federal lands and authorities)

1. Germany:
 - Baden Wuerttemberg
 - Bayern
2. The Czech Republic
3. Austria
4. Slovakia
5. Slovenia
6. Croatia
7. Hungary
8. Serbia
9. Bosnia and Herzegovina
10. Montenegro
11. Moldova
12. Ukraine:
 - Odessa
 - Ivano Frankivska
 - Chernovitsi
 - Zakarpatya
13. Bulgaria
14. Romania

Danube Region

Motorways, expressways and main roads



LEGEND ROADS

- Motorway, expressway
- Main road

PORTS

- Airport
- Seaport
- Inland Port

- Country border
- Outside Danube region
- Sea

- City
- Rivers Danube and Sava

Project: Transport infrastructure in the Danube region – **ROAD LINKS**

- **Client – Ministry of Infrastructure, Slovenia**



REPUBLIC OF SLOVENIA
MINISTRY OF INFRASTRUCTURE

Project was prepared by – SLOMAN d.o.o.

SLOMAN company activities

- Consulting and leading of projects and supervision in traffic infrastructure
- Preparing of professional assignments, studies and reports
- Leading of professional associations
- Preparing of technical and project design for road and traffic infrastructure
- Implementation of new technologies in building and maintenance of road infrastructure
- Pavement measurements and measurements of road surroundings
- PMS - Pavement Management System
- Preparation and executing of environmental projects
- Organising and preparing of technical regulations, ensuring system and quality control for traffic infrastructure
- Organising of specialized technical events, round tables and conferences
- International projects and cooperation



Data gathering:

Phase 1: Official EU databases (EUROSTAT, Road statistical year book 2016, official EU websites)

Phase 2: A questionnaire (first part) was sent to countries which are a part of the region

Phase 3: A questionnaire (second part) was sent to countries which are a part of the region

Phase 4: A draft of the elaborat was sent to countries for an overview of data and any additional comments

Elaborat (general report)

General data

1. Description of the road network
2. Main features of the road network
 - Traffic
 - International road corridors
 - Toll system
 - Condition of road surfaces and structures
 - Speed Limits
 - Traffic safety
 - Main weaknesses on the road network
 - Missing sections
 - Bottlenecks
 - Hazardous road sections
 - Inadequate protection of the environment and inhabitants
 - Links with neighbouring countries
 - Protection of the environment and inhabitants from the impact of road traffic (noise, water)
 - Systems for informing users of individual transport systems
 - Notification by category of roads
 - Ways of informing
 - Responsibility and operators

Elaborat (general report)

4. Investing spending and maintenance expenditures

- Gross investment spending in road infrastructure
- Maintenance expenditures in road infrastructure

5. The objectives of the transport policy and the future development of the road network

- The goals of the transport policy
- The main priorities of road development

Motorway map

Motorway and main road map

Sources of graphic data:

<http://ec.europa.eu/eurostat/web/gisco/geodata/reference-data/administrative-units-statistical-units>

<http://download.geofabrik.de/europe.html>

<https://www.eea.europa.eu/data-and-maps/data/eu-dem#tab-european-data>

<https://www.google.com/maps>

The maps were created with the program ArcGIS.

**A brochure and a elaborat
was prepared using the
gathered data**

**Review of the road data in
the region and in
individual country**

Interreg
Danube Transnational Programme
RDR

**DANUBE REGION
strategy**
Mobility | Rail-Road-Air

EUROPEAN UNION

Transport Infrastructure in the Danube region – **ROAD LINKS**

Austria • Bosnia and Herzegovina • Bulgaria • Croatia • The Czech Republic •
Germany (Baden-Württemberg and Bavaria) • Hungary • Montenegro •
Moldova • Romania • Serbia • Slovakia • Slovenia • Ukraine (Odessa,
Ivano-Frankivsk, Chernivitsi and Zakarpattia Oblast)

The project is co-funded by EU funds (ERDF and IPA-II)
March 2018

Prepared by: **SLOMAN**
Company for Consulting
& Engineering, Ltd.

Basic information about the Danube region and roads

The Danube region includes 14 countries (18 countries, federal lands and authorities)

1. Germany:
 - Baden Wuerttemberg
 - Bayern
2. The Czech Republic
3. Austria
4. Slovakia
5. Slovenia
6. Croatia
7. Hungary
8. Serbia
9. Bosnia and Herzegovina
10. Montenegro
11. Moldova
12. Ukraine:
 - Odessa
 - Ivano Frankivska
 - Chernovitsi
 - Zakarpatya
13. Bulgaria
14. Romania

Population and land area

- Number of inhabitants in the Danube region:

112 mio (2016)

- Total land area of the Danube region:

1.1 mio km²

Length of different type of roads in the Danube region

Classification* of roads:	km	%
length of motorways	13.107	1,5
length of main or national roads	113.115	12,9
length of secondary or regional roads	210.927	24,0
length of other roads	542.768	61,7
total lengths of all roads	879.916	100,0

*data about the classification of national roads in individual categories is not uniform in all countries. Nevertheless, we followed the sorting in the EU bases and tried to unify the categories as much as possible.

Danube Region

Motorways, expressways and main roads



LEGEND ROADS

- Motorway, expressway
- Main road

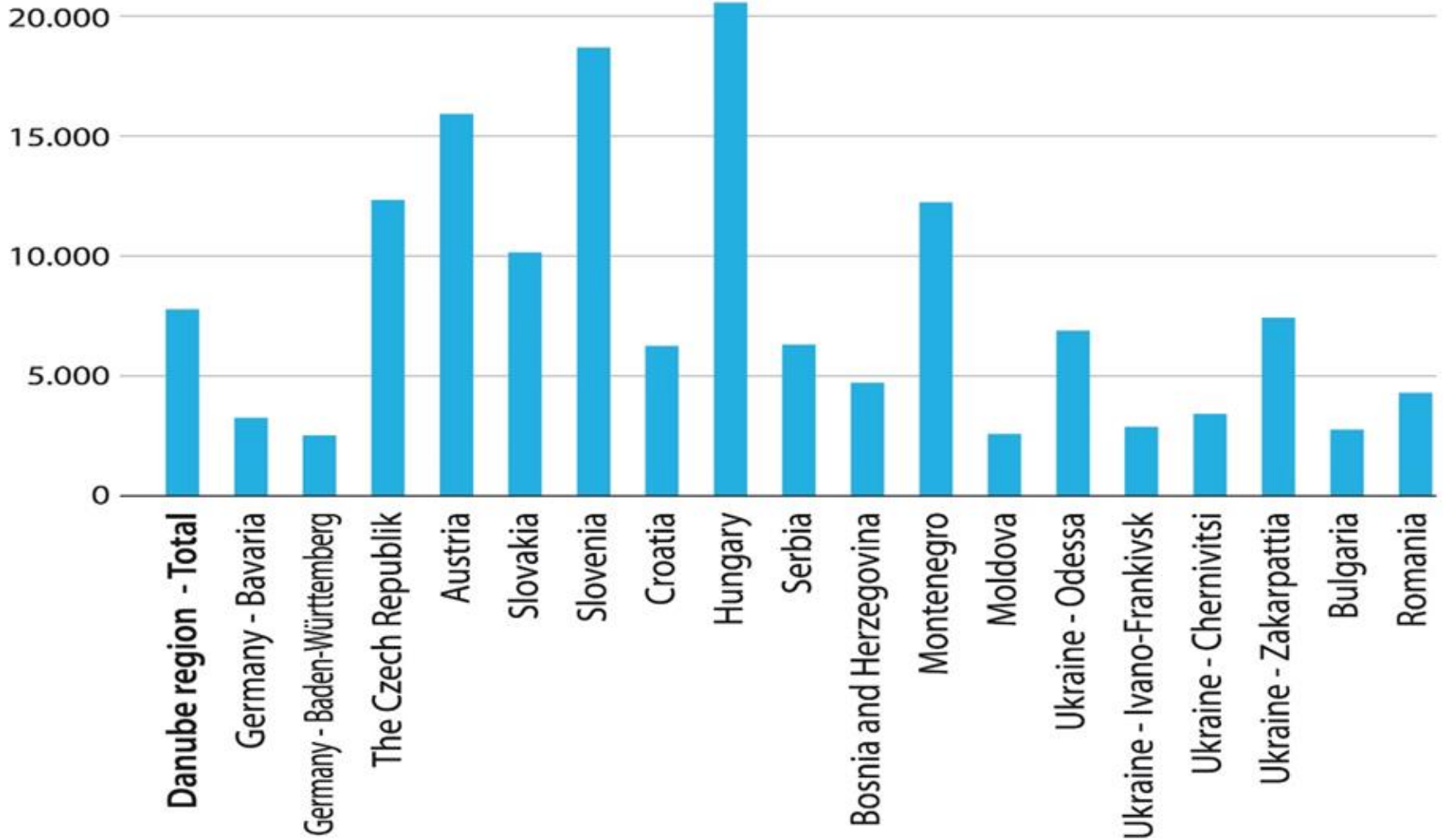
PORTS

- Airport
- Seaport
- Inland Port

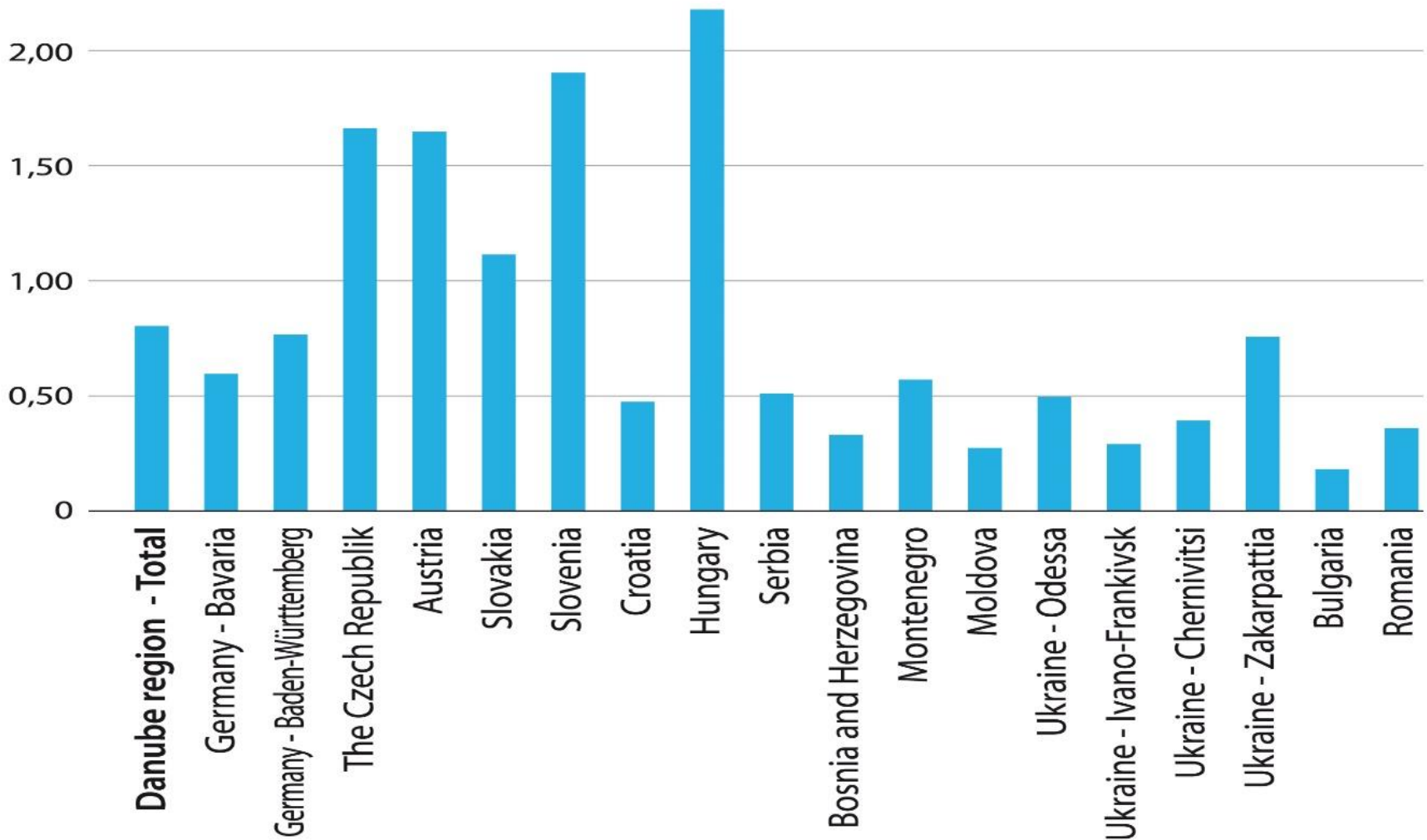
- Country border
- Outside Danube region
- Sea

- City
- Rivers Danube and Sava

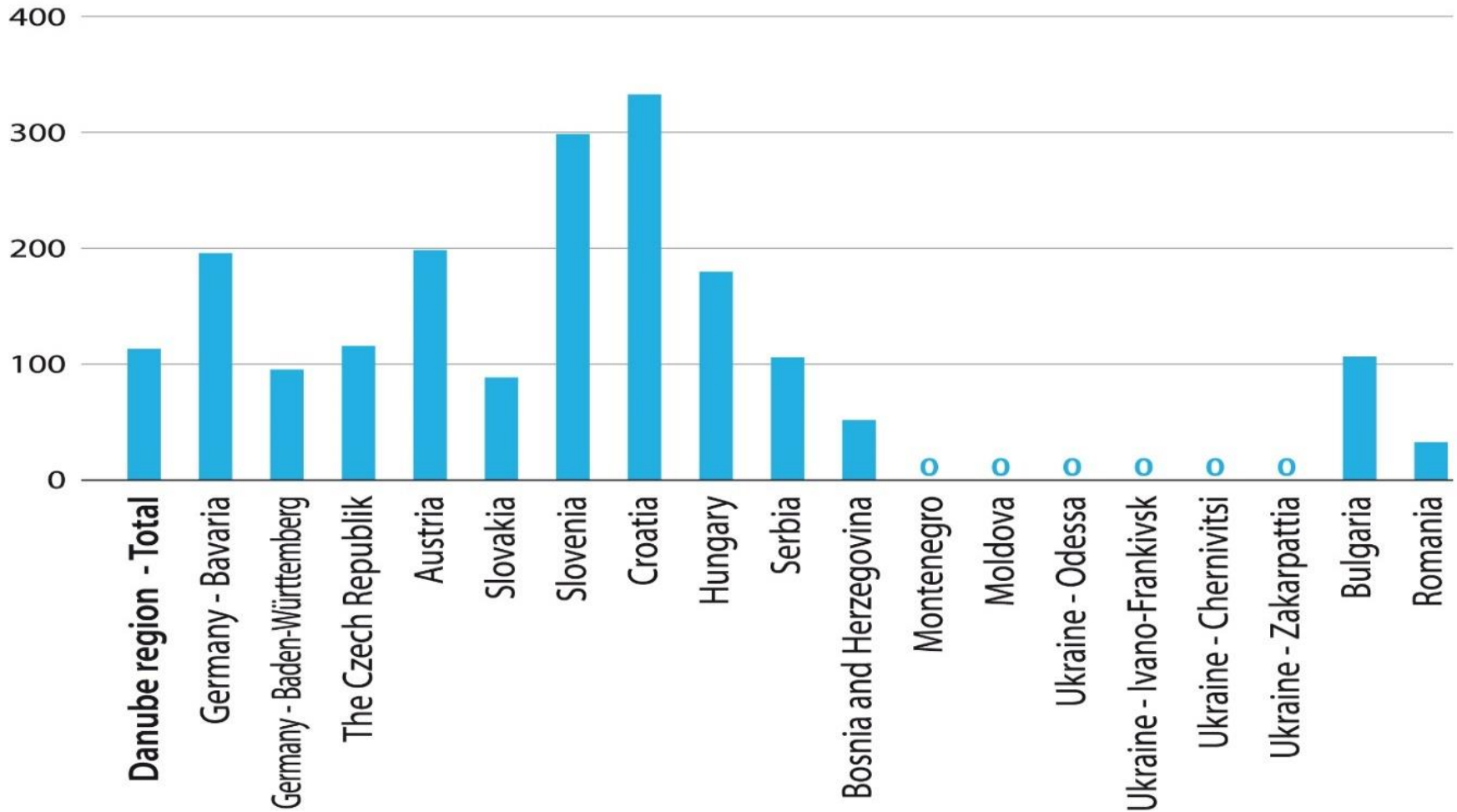
Kilometers of roads per million inhabitants



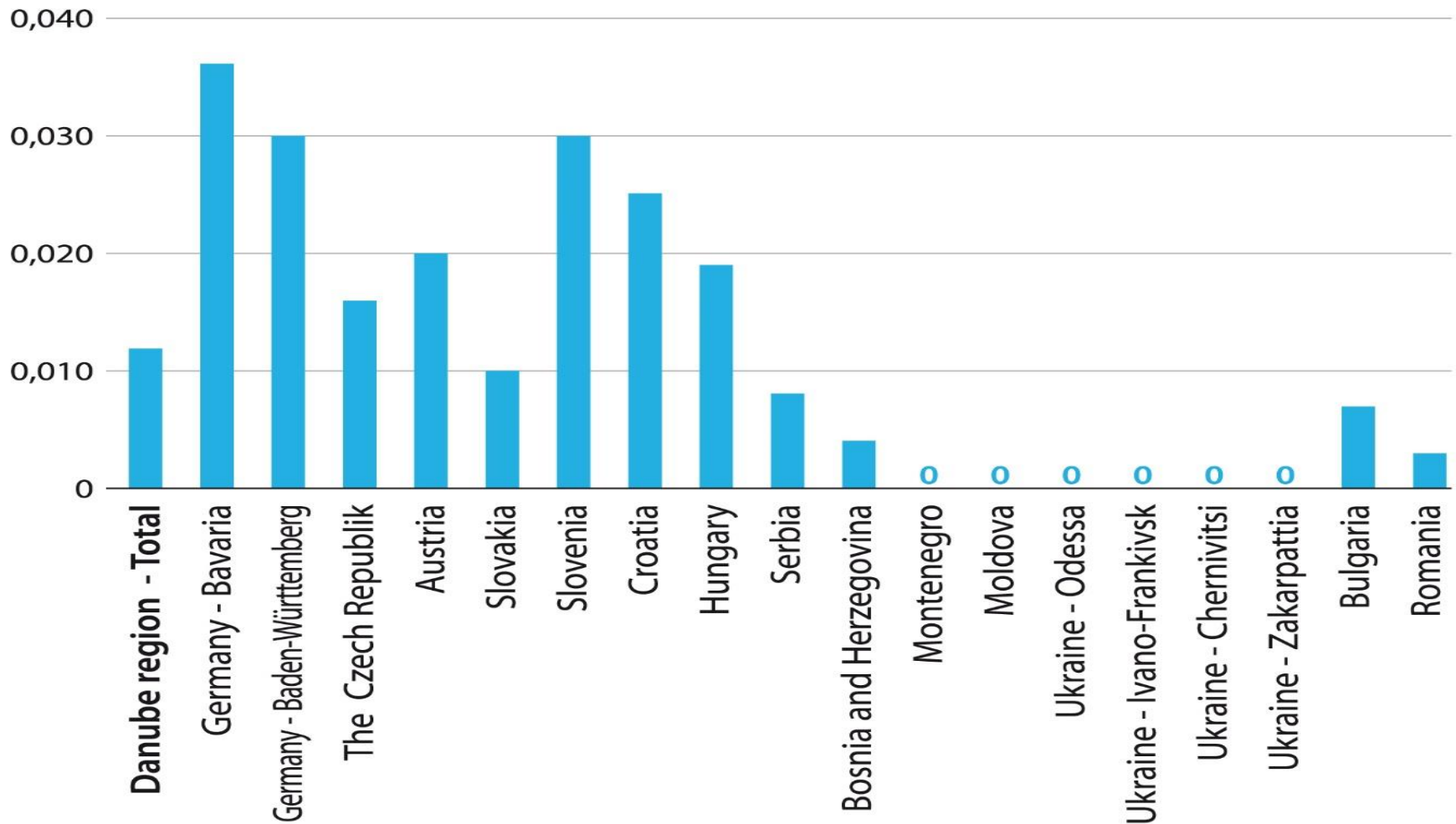
Kilometers of roads per km² of the land area



Kilometers of motorways per million inhabitants

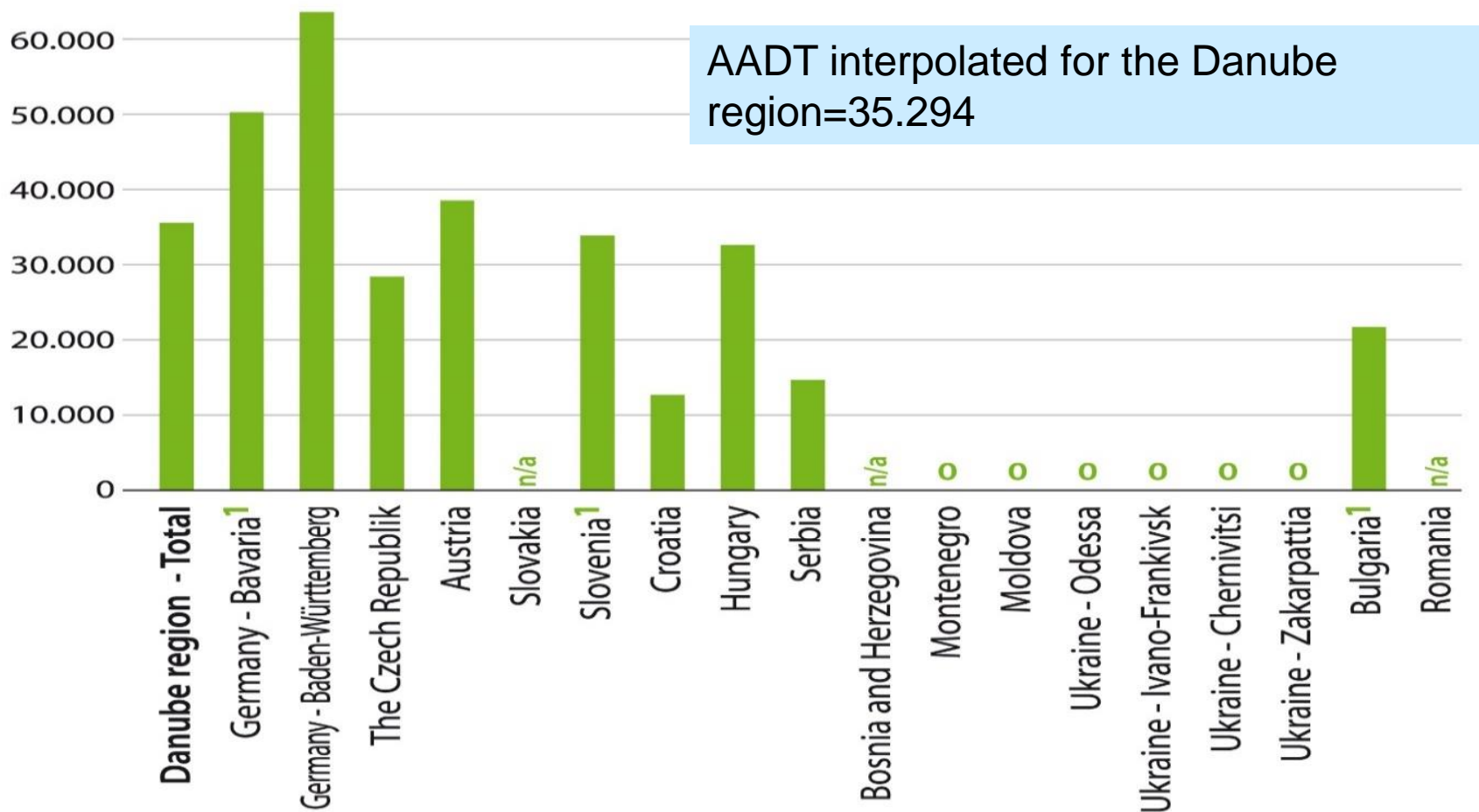


Kilometers of motorways per km² of the land area

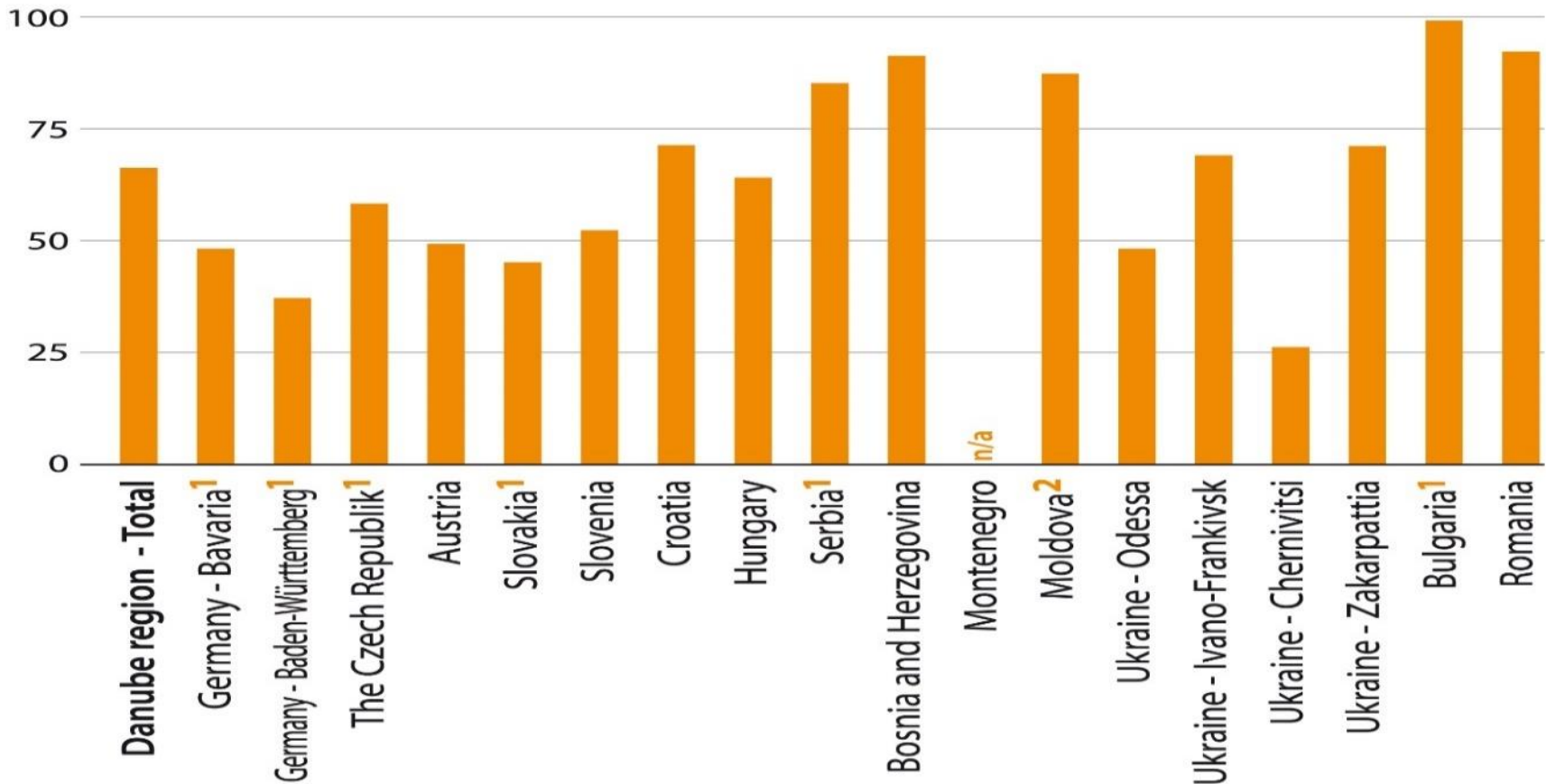


Traffic and safety

Average annual daily traffic (AADT) on motorways in year 2016 (2015¹)

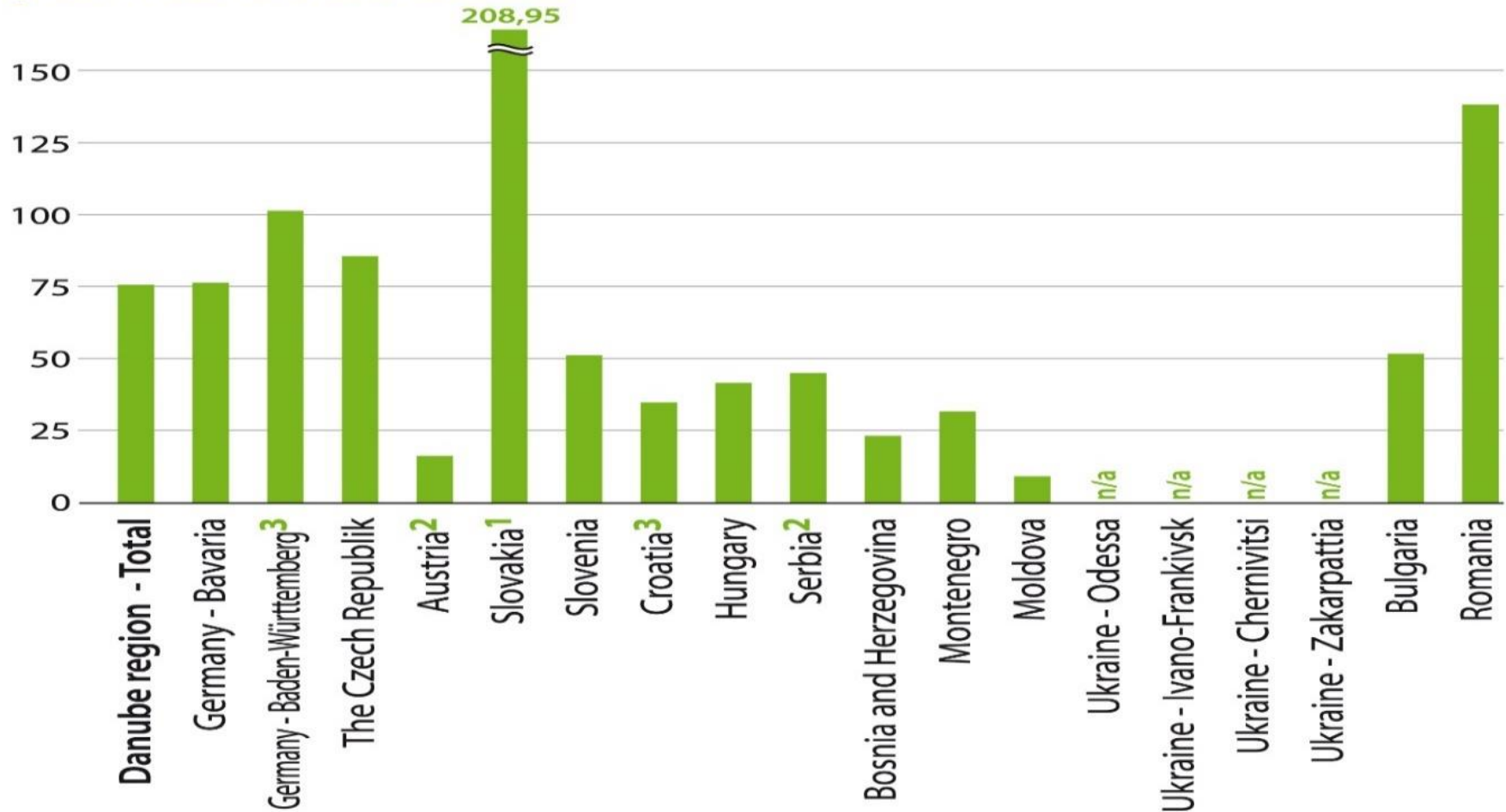


Traffic safety - number of killed persons per million inhabitants in road accidents in year 2014 (2016¹, 2017²)

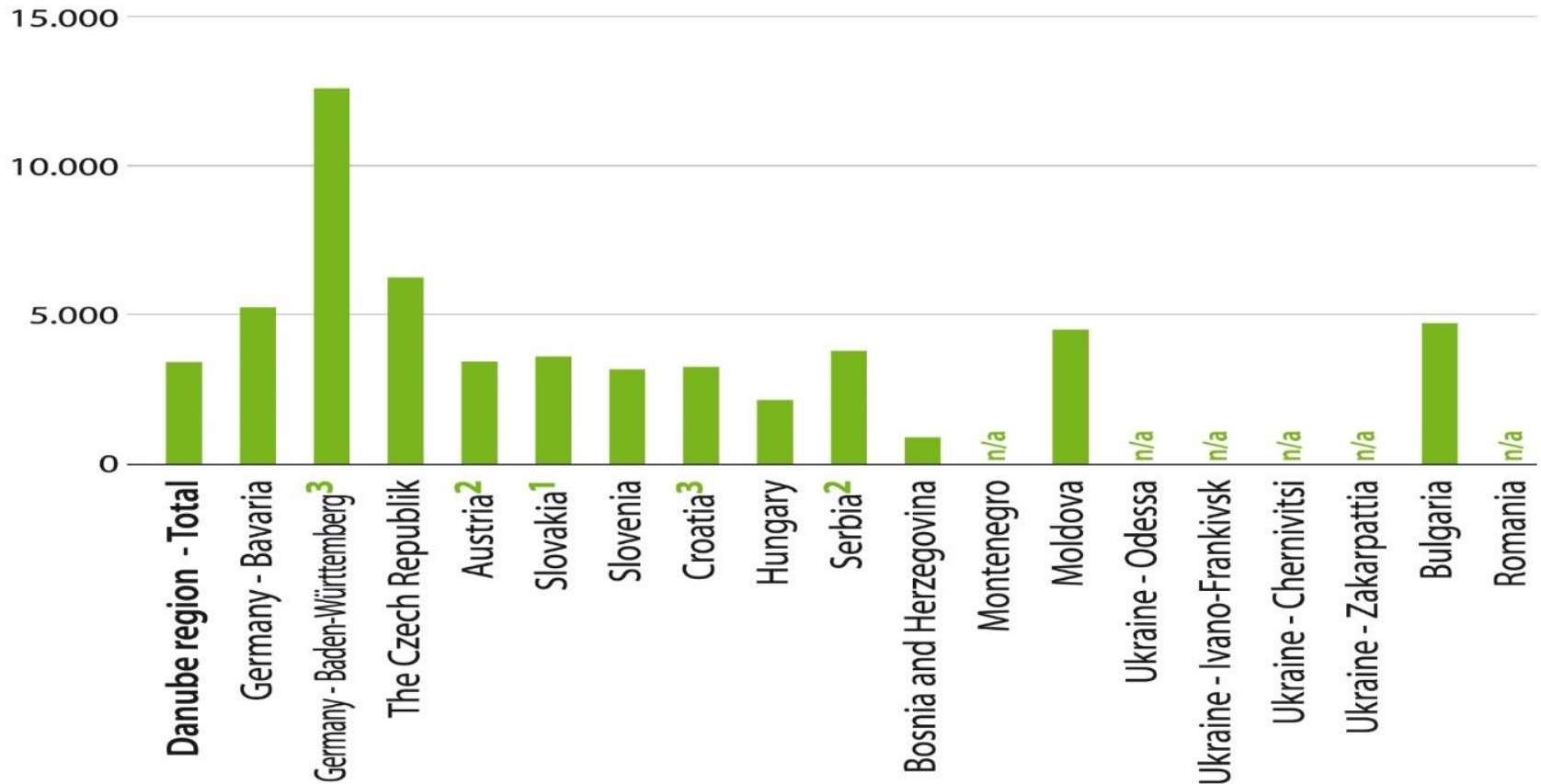


Data about investments and maintenance

Gross investment spending in road infrastructure in mio EUR/year 2013 (2015¹, 2016², 2017³) per mio inhabitants



Maintenance expenditures in road infrastructure in EUR/year 2013 (2015¹, 2016², 2017³) per km of road network (length of all roads)



Condition of road surfaces and structures

Differences in road surfaces and structures between countries occur mainly because of:

- the age of the road network
- traffic loads
- investments in new roads
- maintenance

Condition of road surfaces and road structures*

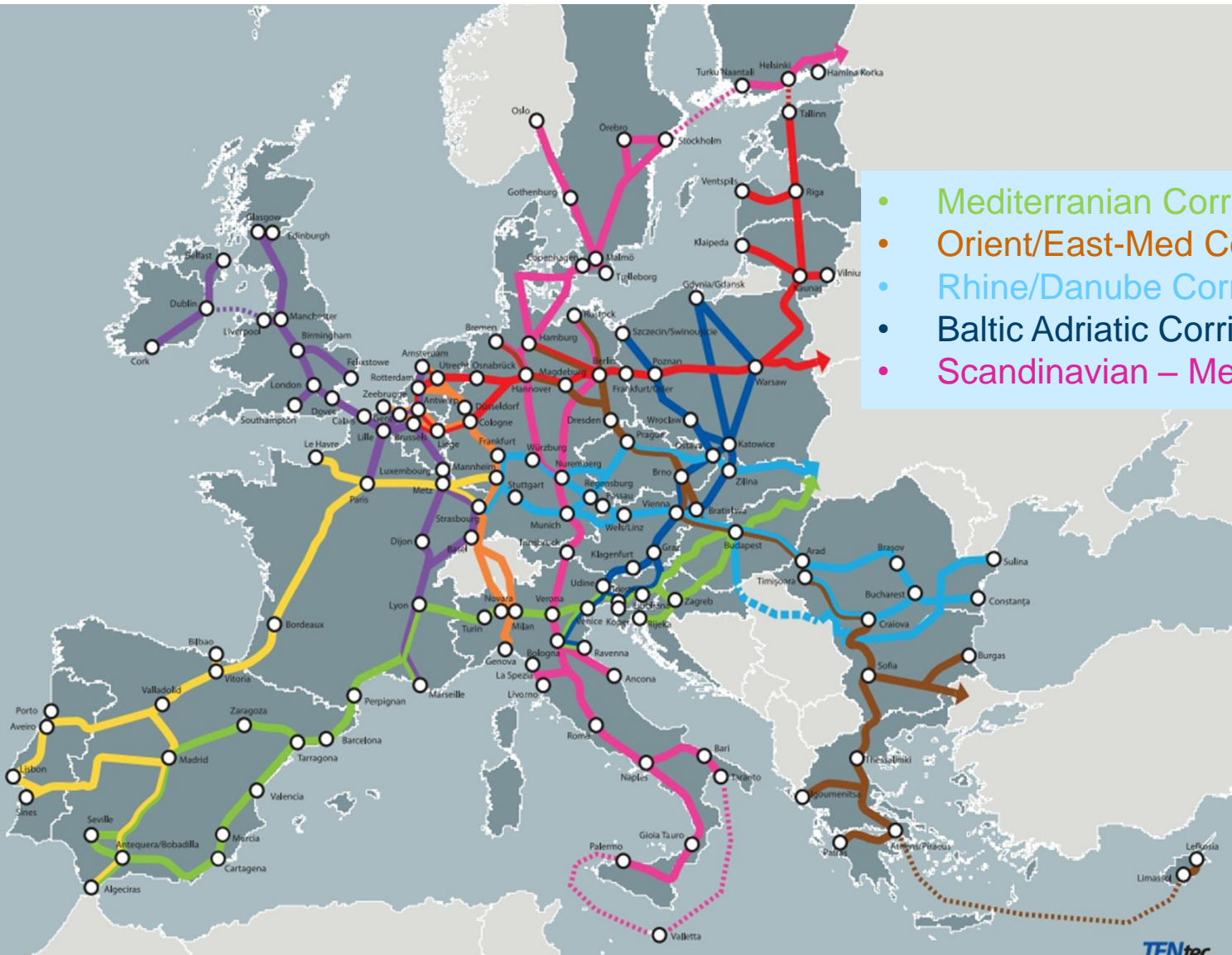
		min	max	average
pavement structures on motorways in %	good	10	100	71,03
	marginal	0	47,4	22,57
	poor	0	62	20,66
pavement structures on national roads in %	good	15	70	40,97
	marginal	10	58,35	28,55
	poor	10	60	30,48
road structures on motorways in %	good	76,9	100	63,03
	marginal	0	16	5,73
	poor	0	14,3	2,67
road structures on national roads in %	good	21	90	31,96
	marginal	10	60	23,67
	poor	0	43	15,80

*complete data about condition of road surfaces and structures was obtained from 4 countries.

*uncomplete data about condition of road surfaces and structures was obtained from 4 countries.

TEN-T corridors and bottlenecks

TEN-T corridors in EU countries (5 in Danube region)



- Mediterranean Corridor
- Orient/East-Med Corridor
- Rhine/Danube Corridor
- Baltic Adriatic Corridor
- Scandinavian – Mediterranean Corridor

Extended TEN-T corridors in non-EU countries in Danube region

- Mediterranean Corridor
- Orient/East-Med Corridor
- Rhine/Danube Corridor



Most problematic missing sections and bottlenecks in the Danube region are:

- **the Rhine-Danube Corridor:** on the Bavarian motorway A8 south of Munich towards the German border of Austria
- **the Baltic – Adriatic Corridor and Orient - East Mediterranean Corridor:** road cross-border section Brno (CZ) – Wien (Schwechat) (AT)
- **Orient - East Mediterranean Corridor:** in Bulgaria, Struma - the border with Greece.
- **On the comprehensive network,** the missing sections and bottlenecks are most exposed on sections:
- the Karawanks tunnel between Austria and Slovenia and in Hungary, the bypass Csorna in the direction to Austria or Slovenia.

.....

(for more information see Elaborate)

Missing sections and bottlenecks

- In countries where motorway network is available but not completed
- Sections with low traffic permeability
- Traffic jams at rush hours in larger cities and nearby urban agglomerations where traffic is mixed (i.e., long distance, regional and urban)
- Traffic jams due to Maintenance work
- Other local bottlenecks

Main goals and measures on roads in Danube region

Main goals of transport policy in Danube Region countries are:

- improving mobility and accessibility
- reducing travel times
- improving supply of the economy
- increasing road safety
- reducing energy consumption and emissions

General measures on roads in Danube region

- ensuring an adequate standard of existing road infrastructure, including road rehabilitation
- traffic safety
- protection of the natural and living environment from the impact of road transport
- improving accessibility to regional center
- preparedness for extreme weather events and
- road measures in individual parts of the country



PMS - Pavement Management System

Main goal of Pavement management system

- A preparation of the most optimal strategy for road maintenance
- The best economical and technical solution
- Increased safety
- Comfortable driving

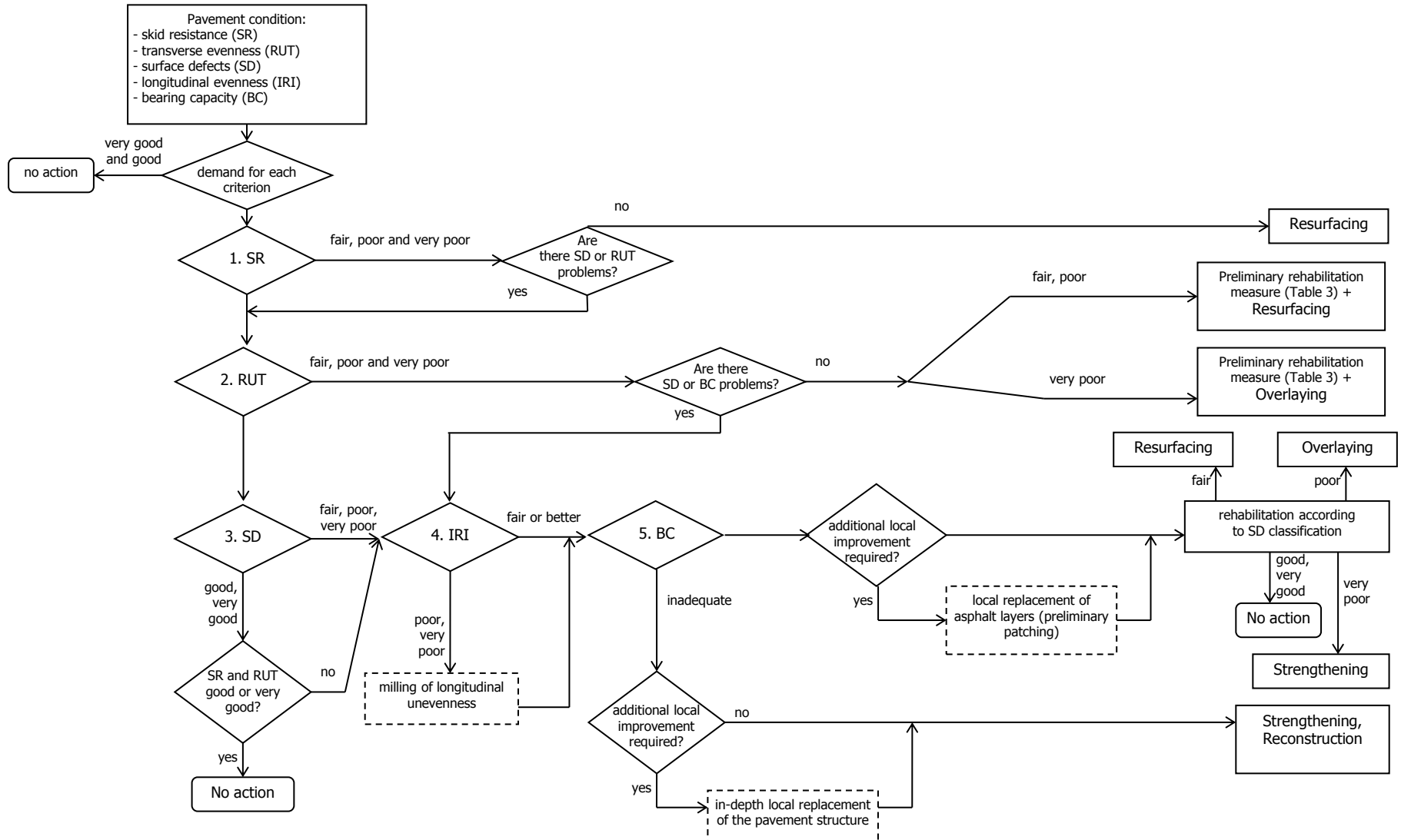
PMS in Danube region

- Significant differences between countries
- Good practices where PMS was implemented

Pavement management systems in countries

Countries	Type of PMS system
Baden	
Wuerttemberg	PMS - unknown type
Bavaria	PMS - unknown type
Austria	a computer-aided system (e.g. DTIMS_CT)
Slovakia	software tools especially developed for Information System of Road Network Model
Slovenia	a computer-aided system (e.g. DTIMS_CT)
Hungary	a computer-aided system (e.g. DTIMS_CT)
Bosnia and Hercegovina	a computer-aided system (e.g. DTIMS_CT)
Moldova	a computer-aided system (e.g. DTIMS_CT)
Odessa	PMS - unknown type

Methodology for choosing the best (economical and technical) possible pavement measure



Further development

Further development of road network in the Danube region

Integrated policy between countries, for management and planning of road network

Road maintenance

- Constant investments – Golden rule of investment
- Pavement Management Systems
- Ecological measures
- Constant development and education
- Advanced technology (recycling, low noise, low rolling resistance, warm asphalt, ...) and digitalisation

Policy for further road development in the Danube region

- Implementation of TEN-T corridors
- Ensuring stable long term funding
- Knowledge transfer between countries
- Cooperation with neighboring countries

Further work on road field in Danube Region

- Connection of databases and usage of same methodology
- Development of intelligent road systems, toll systems and their connection between countries
- Further research and development
- Cooperation on all levels

Further work on other traffic systems

- railroad
- harbor
- airport

Conclusion

Conclusion

- Road network is a national treasure to the country and to the whole region. Therefore, this infrastructure should be properly maintained.
- The Transport Infrastructure Study in the Danube region - road links, shows the basic data on the network in the Danube region.
- The current road quality level, as is evident from the study, is a result of different developmental, landscape and climatic variations in the Danube Region
- The study will be able to serve a number of purposes, for further joint treatment

Concluding thoughts

Hard, professional, interdisciplinary, well-organized and intensive work may lead to the successful implementation of major projects.

Only a well maintained road network will enable reaching the Vision Zero Goal (no deaths on roads)



*„ It is not the wealth
of a nation that builds
roads, but the roads
that
build the wealth
of nation.“*

John F. Kennedy



SLOMAN

Company for Consulting
& Engineering, Ltd.

*Thank you for your attention!
Questions?
info@sloman.eu*