ITS Roadmap for the Danube Region

Based on the Results of the EUSDR Stakeholder Survey

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1 INTRODUCTION

1.1 Scope of this document

The *EU Strategy for the Danube Region* (EUSDR)[1] was launched as a second macro-regional strategy in 2011 by the European Commission. Today, 14 Danube Region countries participate in EUSDR, encompassing nine EU Member States and five third countries. Mobility and transport is a key issue in the EUSDR. "Connecting the Danube Region" is one of the four thematic pillars of the Danube Region Strategy. As part of one pillar a defined priority area is "improving mobility and multimodality", both on inland waterways, as well as on road, rail and air links.

The *EUSDR Action Plan*[2] that accompanies the Danube Region Strategy formulates specific fields of action in regard to the EUSDR objectives. The focus of the present roadmap is on Action No. 7 "to develop further intelligent traffic systems by using environmental-friendly technologies, especially in urban regions". The preparation of a roadmap for the deployment of Intelligent Transport Systems (ITS) in the Danube Region has been started at the EUSDR Workshop "Roadmap for the Deployment of ITS in the Danube Region" held in the frame of the ITS Austria Conference in September 2014. In this workshop, hosted by the coordinator of the priority area "land transport", Mr Franc Žepič from the Slovenian Ministry of Infrastructure and Spatial Planning, ITS deployment in the Danube Region was discussed with key stakeholders from the EUSDR countries.

It has been agreed at the EUSDR workshop that the needs and priorities of all Danube Region countries are most important in order to finally rank and prioritise the fields of action considered in a deployment plan. Thus a stakeholder survey was launched in November 2014 to allow a prioritisation of ITS topics by all Danube Region countries. The results of this survey are outlined in this document and are the basis of the EUSDR ITS roadmap. The roadmap is intended to support the Action No. 7 through tangible ITS deployment topics that are agreed with a wide range of stakeholders in the EUSDR countries.

1.2 The EUSDR Stakeholder Survey

The stakeholder survey was conducted in order to capture the ITS priorities of the ITS community in the Danube Region countries and to get feedback on the 15 fields of action, i.e. ITS services/measures. Setting priorities was achieved by means of a standardised questionanaire to stakeholders. They were asked to assess a set of ITS services/measures (table 1) according to the national plans and strategies and to collect crucial additional fields of action which were not covered.

The objective of the stakeholder survey was to *capture the opinion of the ITS community in the Danube Region* countries. Representatives from public administration, authorities (like Ministries), public transport operators or associations, motorway, road or railway operators, transport related service providers and ITS associations (e.g. ITS Nationals) have been addressed.

The participants in the survey are asked to prioritise the ITS services in regard to the policy framework in their country, taking into account national ITS action plans and strategies. Despite of this fact, ***the survey cannot be considered as an inquiry and analysis of national ITS action plans and their defined fields of action. It must rather be seen as an approach to obtain the opinion of the whole ITS community in the country, including the public viewpoint as well as the industry's viewpoint.***

Nevertheless, the official national ITS priorities are crucial for a common Danube Region roadmap. As a consequence the public sector is regarded as an important part of the respondents. Therefore, the prioritisation of the single countries is considered as biased or incomplete if the targeted mix between industrial and public organisations is not reached.

[1] http://www.danube-region.eu/component/edocman/communication-of-the-commission-eusdr-pdf
[2] http://www.danube-region.eu/component/edocman/action-plan-eusdr-pdf

Nr	ITS service/measure	Description
	Multimodal Passenger Services	
1	Access to static road data	Provision of static road or transportation data (e.g. digital maps on transportation network, directed graphs of the road network, but also data about road type, road condition, traffic regulations, speed limits, accident hotspots, other safety related locations, etc.), also to third parties.
2	Access to dynamic road data (real-time traffic data)	Making available and accessible existing and accurate real-time road data. Such data include real-time traffic condition, as well as information on incidents (e.g. accidents, weather warnings) and other events (e.g. road works, construction sites, road blocks, etc.).
3	Access to public transport data via an harmonised interface	Provision and/or exchange of public transport data in a format that enables interoperability. Such data are static data, like timetables, transport graphs, location of stations and stops (train, tram or bus), in some cases also fare products and price structure, but also to dynamic real-time service status information (e.g. time of arrival and departure, service disruption, position of vehicles, delays and status of elevators, escalators).
4	Access to information on charging points for alternative fuel vehicles	Collection and provision of data and information about the availability of charging infrastructure (loading stations, charging points) for alternative fuels (like electricity, hydrogen and natural gas (CNG and LNG) also to third parties.
5	Provision of multimodal traveller information services	Multi-modal travel planning is regarded as a key element of ITS deployment (Priority Action A of the IST Directive COM 2010/40/EU. It provides the traveller with comprehensive door-to-door information allowing for well-informed travel decisions. It seamlessly integrates information for different modes, based on a strong backbone of rail and local public transport.
6	Integrated, electronic fare management (local, national or trans-national)	Integrated, electronic fare management enables a traveller to make a journey that involves transfers within or between different transport modes with a single ticket that is valid for the complete journey.
7	Vehicle sharing concepts (car sharing, carpooling, bike sharing, etc.)	Introduction and promotion of any vehicle sharing concepts (including bicycles) as alternative or additional concept to private car usage.
8	Services for people with special needs	Services for persons with reduced mobility, for disabled persons or other special needs. European legislation gives people with reduced mobility rights related to the special needs in transportation. Such special needs can also be regarded in the field of ITS (e.g. in travel information systems, route planners or by providing special assistance in public transport, airports, railway stations, etc. by the use of ICT with the objective to improve the accessibility of transport means and any many others).
	Freight Services	
9	Provision of historic traffic data	Provision of historic data, i.e. data from freight operators or data gained by in-vehicle devices, like origin, destination, goods class, form of conveyance, vehicle type and many others. Such data can be used for freight transport modelling by authorities and for the improvement of traffic information services.
10	Intelligent Truck Parking	This service gives truck drivers access to information on the availability of secure parking places for their trucks.
11	Services for Tracking and Tracing of Goods	ITS technologies are essential for the introduction of eFreight services that give information on the location and condition of transported goods in a secure way (Freight Transport Logistics Action Plan - COM 2007/1321). In most of the cases services for tracking and tracing of goods are related to the transportation of dangerous/hazardous goods and/or live animals
12	Electronic consignment notes (Improving customs as well as access to data for 3rd parties)	Introduction of electronic consignment notes in road transport, as well as integrated new services using electronic consignment notes for improved and fast customs. In order to provide new services the access to third parties (like ITS service developers) is required.
13	Intelligent tolling services (dynamic tolling)	Tolling services that consider additional information, like data on the traffic conditions. With dynamic pricing, tolls can be continually adjusted according to traffic conditions to maintain a free-flowing level of traffic.
	Emerging Services	
14	Probe Vehicle Data	Vehicle Probe data (e.g. floating car data from private car, taxis or transport fleets, floating cellular data from private operators, etc.) are the basis for real-time travel time data collection, real-time traffic operations monitoring, incident detection, and route guidance applications and others applications.
15	C-ITS (Cooperative Systems)	Technologies that are linking the vehicles to other vehicles and also vehicles to infrastructure.

Table 1: ITS services/measures assessed in the stakeholder survey

1.3 Participation

In total 8 of the 14 EUSDR countries participated in the stakeholder survey (Figure 1). The figure 2 below shows the national proportion of the participants. Besides, a good variety of different types of stakeholders (from public administrations/authorities over operators to private service providers) could be reached (Figure 3).

Figure 1: EUSDR Countries participating in the survey

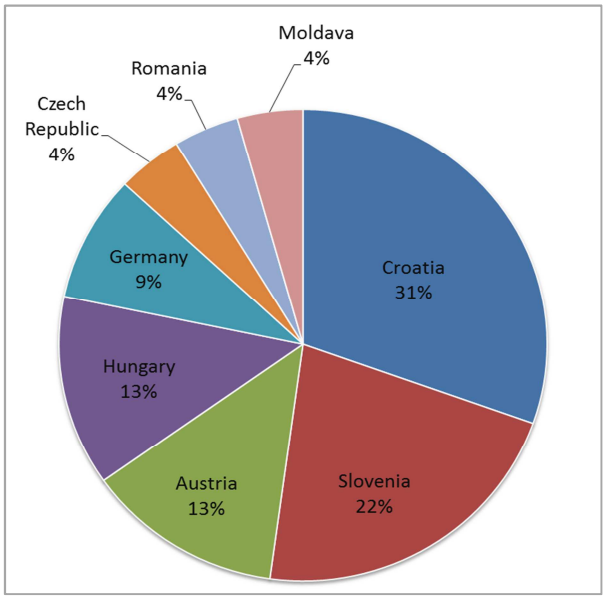

Figure 2: Participation in Stakeholder Survey – Nationalities

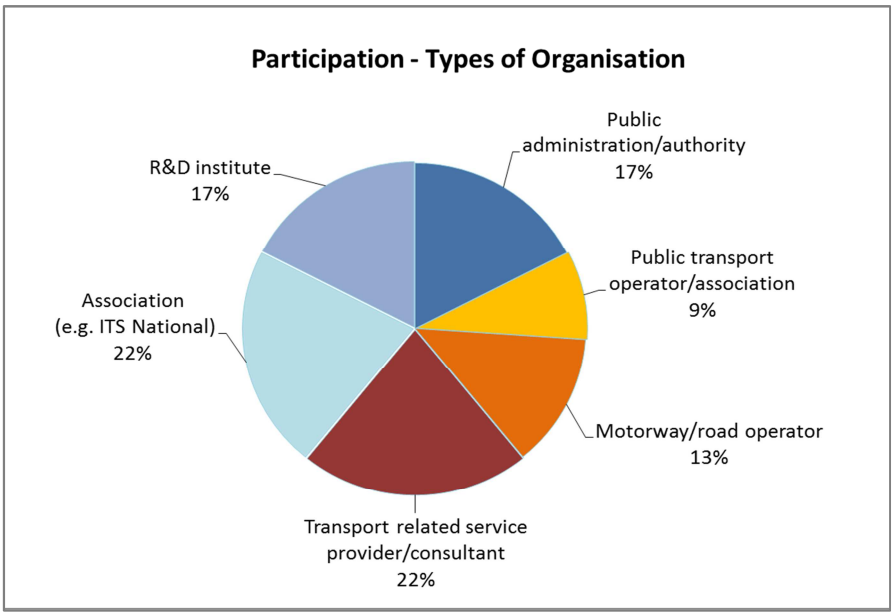

Figure 3: Participation in Stakeholder Survey – Types of Organisations

2 EVALUATION METHOD

In order to create transparent and comprehensible results the evaluation method is outlined in this section. The method for creating the ITS roadmap based on the survey includes three main steps that are schematically shown in Figure 4 and outlined in the following.

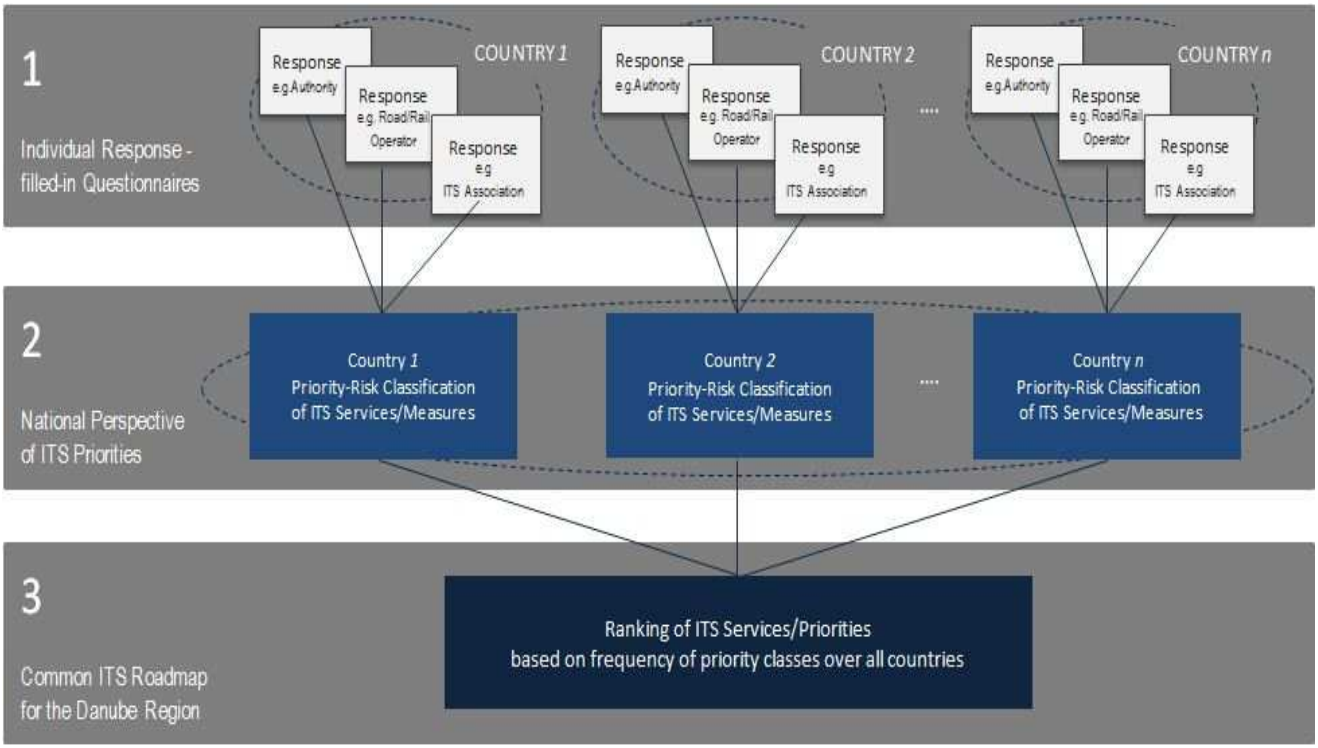

Figure 4: Methodical approach for roadmap compilation

2.1 Step 1 – Prioritisation of ITS services/measures by Individual Responses

The survey participants assessed the priority and deployment risk for each of the ITS services/measures (table 1). As measurable criteria to assess priorities are difficult to conceive, stakeholders' assessment was based on qualitative estimations. This is why it is important to provide a scale-based option which allows to building a comparable ranking. In addition, an assessment of the potential risks (technical, financial, and legal) related to each ITS application was performed using the same scale-based method.

- **Priority -** To assess the priority the participant was asked to assess the strategic relevance and the operative urgency of the ITS service/measure. The purpose was to take into account national ITS Plans and the regulatory and strategic framework in the country. On the other hand stakeholders assessed how urgent a service/measure is considered in regard to the pressing transport challenges in the country. The "priority" criteria results from a combination (average) of both, the strategic relevance and operative urgency.
- **Risk -** By means of the "risk" criteria the barriers and hurdles for deployment are assessed due to expected financial, political and/or legal constraints. The total "risk" criteria is calculated as average from financial, political/legal and technical risks.

2.2 Step 2 – National Perspective on ITS Priorities

In order to get a national picture on the ITS priorities and priority-risk analysis was conducted on the basis of *all* responses of *one* country. That means that the analysis was done country-wise. If more than one organisation gave response to the questionnaire, averages for priority and risk were calculated over all responses of one country. In such cases the priority-risk-analysis represents the common opinion of the ITS community in the country.

The priority-risk analysis enables the clustering of ITS applications into priority-risk categories or areas. The ITS applications with highest priority combinded with the lowest risk can be first considered for deployment. On the other hand, ITS applications with high priority, but high risks for implementation, should be subject to mitigation measures. Based on the priority and risk assessmentof the survey particpants a classification of the ITS instruments are done into priority-risk classes which are:

- **Area A – High priority – low risk:** The ITS services in this class are assessed as strategically important and no major restrictions are expected during implementation.
- **Area B – High priority – high risk:** The ITS services in this class are assessed as strategically important but major restrictions are expected during implementation. Appropriate measures to mitigate the risks must be set before implementation.
- **Area C – Low priority – low risk:** The ITS services in this class are strategically not of superior importance or the importance might not be assessed adequately at present, but no major restrictions are expected during implementation. Therefore, this group of ITS instruments can be realised without major problems, but the priority and/or strategic importance should be investigated in advance.
- **Area D – Low priority – high risk:** The ITS services in this class are strategically not of superior importance and major restrictions are expected during implementation. This group of ITS services should most probably be excluded from deployment plans or at least a detailed evaluation of strategic relevance and connected riks needs to be done.

2.3 Step 3 – Common ITS Roadmap for the Danube Region

A common ITS roadmap is derived from the national priority-risk classifications of all ITS services/measures (step 2). A simple ranking of the ITS services/measures is done according to the frequency of the priority-risk classes. Therefore the ranking shows the degree of consensus of the prioritisation in the countries. That means that in the final ranking the “high priority area” includes ITS services/measures that are assessed by the majority of the countries with high priority.

The official national ITS strategies and plans are crucial for a common Danube Region Roadmap. As a consequence the public sector is regarded as an important part of the stakeholders. Therefore, the priority-risk assessment is considered as biased or incomplete if the targeted mix between industrial and public organisations is not reached. Those countries where no public sector participation could be reached are particularly labelled and marked with the note “biased or incomplete prioritisation”.

3 NATIONAL PERSPECTIVE ON ITS PRIORITIES

3.1 Slovenia

Class	Nr	Action/Service	Priority	Risk	Current Status	Main Focus
B	3	Access to public transport data via an harmonised interface	very high	high	in development up to fully deployed	bus, PT, rail
	5	Provision of multimodal traveller information services	Very high	very high	in progress/in development	mainly on roads
	10	Intelligent Truck Parking	high	Very high	planned/ in preparation	motorways
C	4	Access to information on charging points for alternative fuel vehicles	low	low	planned/in progress to party deployed	urban road network
	1	Access to static road data	balanced	balanced	In development up to fully deployed	motorways
	8	Services for people with special needs	balanced	balanced	partly deployed	-
	14	Probe Vehicle Data	balanced	balanced	no info available	motorways
D	12	Electronic consignment notes (Improving customs as well as access to data for 3rd parties)	balanced	rather high	partly deployed	-
	9	Provision of historic traffic data	low	rather high	In progress/in development	-
	13	Intelligent tolling services (dynamic tolling)	balanced	high	planned/in preparation	motorways
	15	C-ITS (Cooperative Systems)	balanced	high	no info available	motorways
	2	Access to dynamic road data	balanced	high	partly deployed	motorways, secondary road network
	11	Services for Tracking and Tracing of Goods	balanced	high	planned/in preparation	Access for public organisation
	6	Integrated, electronic fare management (local, national or trans-national)	balanced	very high	in progress/in development	Single mode
	7	Vehicle sharing concepts (car sharing, carpooling, bike sharing, etc.)	balanced	very high	partly deployed	urban areas

Table 2: Priority-Risk classification, current status and main focus of ITS in Slovenia

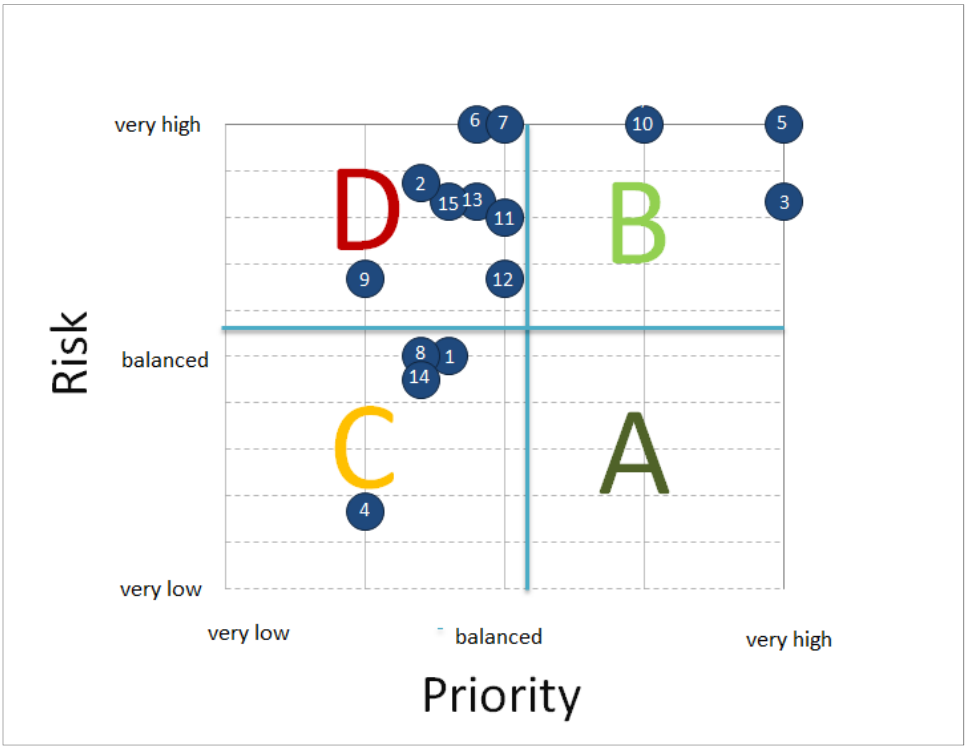

Figure 5: Priority-Risk classification

3.2 Austria

Class	Nr	Action/Service	Priority	Risk	Current Status	Main Focus
A	1	Access to static road data	very high	low	partly deployed	Motorways, (secondary road network, urban network)
	4	Access to information on charging points for alternative fuel vehicles	very high	rather low	partly deployed	motorways (urban network)
	11	Services for Tracking and Tracing of Goods	very high	rather low	planned/in preparation	-
	9	Provision of historic traffic data (freight)	very high	balanced	planned/in preparation	-
	3	Access to public transport data via an harmonised interface	very high	balanced	partly deployed	rail, public transport, bus
	5	Provision of multimodal traveller information services	very high	balanced	partly deployed	road, public transport, rail, multimodal
	10	Intelligent Truck Parking	high	rather low	partly deployed	motorways (secondary road network)
	8	Services for people with special needs	high	rather low	in progress/in development	-
	12	Electronic consignment notes (Improving customs as well as access to data for 3rd parties)	high	balanced	in progress/in development	-
B	6	Integrated, electronic fare management (local, national or trans-national)	very high	rather high	in progress/in development	single mode
	2	Access to dynamic road data	very high	rather high	planned/in preparation	Motorways and urban network
	14	Probe Vehicle Data	very high	rather high	fully deployed	urban network, secondary road network (motorways)
	15	C-ITS (Cooperative Systems)	very high	high	in progress/in development	motorways
C	7	Vehicle sharing concepts (car sharing, carpooling, bike sharing, etc.)	low	balanced	partly deployed	urban, regional
D	13	Intelligent tolling services (dynamic tolling)	balanced	high	no information available	secondary road network, urban network

Table 3: Priority-Risk classification, current status and main focus of ITS in Austria

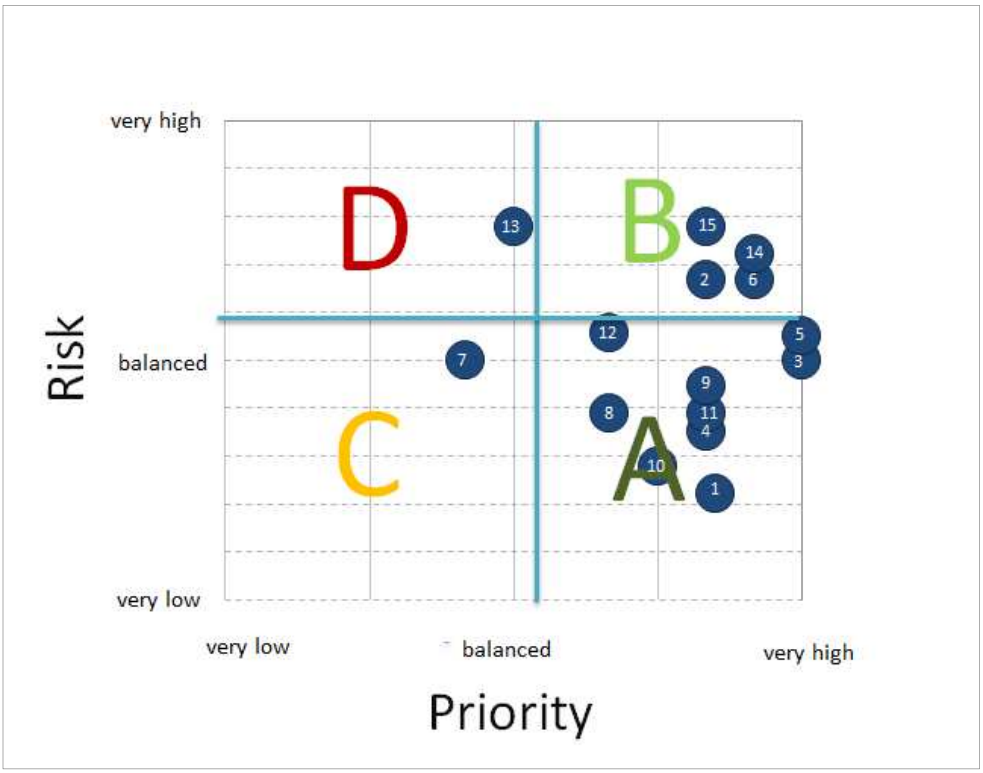

Figure 6: Priority-Risk classification

3.3 Hungary

Class	Nr	Action/Service	Priority	Risk	Current Status	Main Focus
A	14	Probe Vehicle Data	high	balanced	in development up to partly deployed	motorways, urban road network
B	5	Provision of multimodal traveller information services	high	rather high	planned	road, PT, rail, multimodal
	3	Access to public transport data via an harmonised interface	high	rather high	in progress/ in development	PT (rail)
	6	Integrated, electronic fare management (local, national or trans-national)	high	rather high	in progress/ in development	single mode
	12	Electronic consignment notes (Improving customs as well as access to data for 3rd parties)	high	rather high	partly deployed	-
	10	Intelligent Truck Parking	high	high	in progress/ in development	motorways
	2	Access to dynamic road data	very high	high	in progress/ in development	motorways (secondary road network)
C	9	Provision of historic traffic data	low	rather low	deployed	-
	7	Vehicle sharing concepts (car sharing, carpooling, bike sharing, etc.)	very low	rather low	partly deployed	urban areas
	8	Services for people with special needs	balanced	balanced	planned to in progress	-
D	11	Services for Tracking and Tracing of Goods	balanced	rather high	partly deployed	road operator, other freight service provider
	4	Access to information on charging points for alternative fuel vehicles	very low	rather high	planned	urban road network (motorways)
	1	Access to static road data	balanced	rather high	fully deployed on national level	motorways (secondary road network)
	13	Intelligent tolling services (dynamic tolling)	balanced	rather high	planned/in preparation	motorways, urban road network
	15	C-ITS (Cooperative Systems)	low	rather high	no information	motorways

Table 4: Priority-Risk classification, current status and main focus of ITS in Hungary

Figure 7: Priority-Risk classification

3.4 Croatia

Class	Nr	Action/Service	Priority	Risk	Current Status	Main Focus
B	11	Services for Tracking and Tracing of Goods	high	rather high	planned/in preparation	n.a.
	8	Services for people with special needs	high	rather high	in progress/in development	n.a.
	2	Access to dynamic road data	high	rather high	in progress/in development	n.a.
	6	Integrated, electronic fare management (local, national or trans-national)	high	high	in progress/in development	n.a.
	12	Electronic consignment notes (Improving customs as well as access to data for 3rd parties)	high	high	in progress/in development	n.a.
	1	Access to static road data	high	high	partly deployed	n.a.
	3	Access to public transport data via an harmonised interface	high	high	partly deployed	n.a.
	5	Provision of multimodal traveller information services	high	high	planned/in preparation	n.a.
	13	Intelligent tolling services (dynamic tolling)	balanced	high	partly deployed	n.a.
C	9	Provision of historic traffic data	balanced	balanced	partly deployed	n.a.
D	14	Probe Vehicle Data	low	rather high	not planned	n.a.
	10	Intelligent Truck Parking	low	rather high	planned/in preparation	n.a.
	4	Access to information on charging points for alternative fuel vehicles	low	rather high	planned/in preparation	n.a.
	7	Vehicle sharing concepts (car sharing, carpooling, bike sharing, etc.)	low	rather high	in progress/in development	n.a.
	15	C-ITS (Cooperative Systems)	low	very high	planned/in preparation	n.a.

Table 5: Priority-Risk classification, current status and main focus of ITS in Croatia

Figure 8: Priority-Risk classification

3.5 Germany

Class	Nr	Action/Service	Priority	Risk	Current Status	Main Focus
A	2	Access to dynamic road data	very high	rather low	partly deployed	motorways (secondary road network, urban network)
	14	Probe Vehicle Data	high	rather low	partly deployed	Urban road network (motorways, secondary road network)
B	10	Intelligent Truck Parking	very high	rather high	partly deployed	motorways
	1	Access to static road data	high	rather high	partly deployed	motorways (secondary road network)
	15	C-ITS (Cooperative Systems)	high	high	in progress/in development	motorways (secondary road network, urban network)
C	4	Access to information on charging points for alternative fuel vehicles	low	low	planned/in preparation	urban network (motorways, secondary road network)
	5	Provision of multimodal traveller information services	balanced	rather low	partly deployed	multimodal
	8	Services for people with special needs	balanced	balanced	partly deployed	-
	11	Services for Tracking and Tracing of Goods	low	balanced	partly deployed	-
	9	Provision of historic traffic data	very low	balanced	partly deployed	-
D	3	Access to public transport data via an harmonised interface	balanced	rather high	in progress/in development	rail, PT
	12	Electronic consignment notes (Improving customs as well as access to data for 3rd parties)	low	rather high	in progress/in development	-
	13	Intelligent tolling services (dynamic tolling)	very low	rather high	in progress/in development	urban road network
	7	Vehicle sharing concepts (car sharing, carpooling, bike sharing, etc.)	low	rather high	partly deployed	urban, regional
	6	Integrated, electronic fare management (local, national or trans-national)	low	high	partly deployed	PT

Table 6: Priority-Risk classification, current status and main focus of ITS in Germany

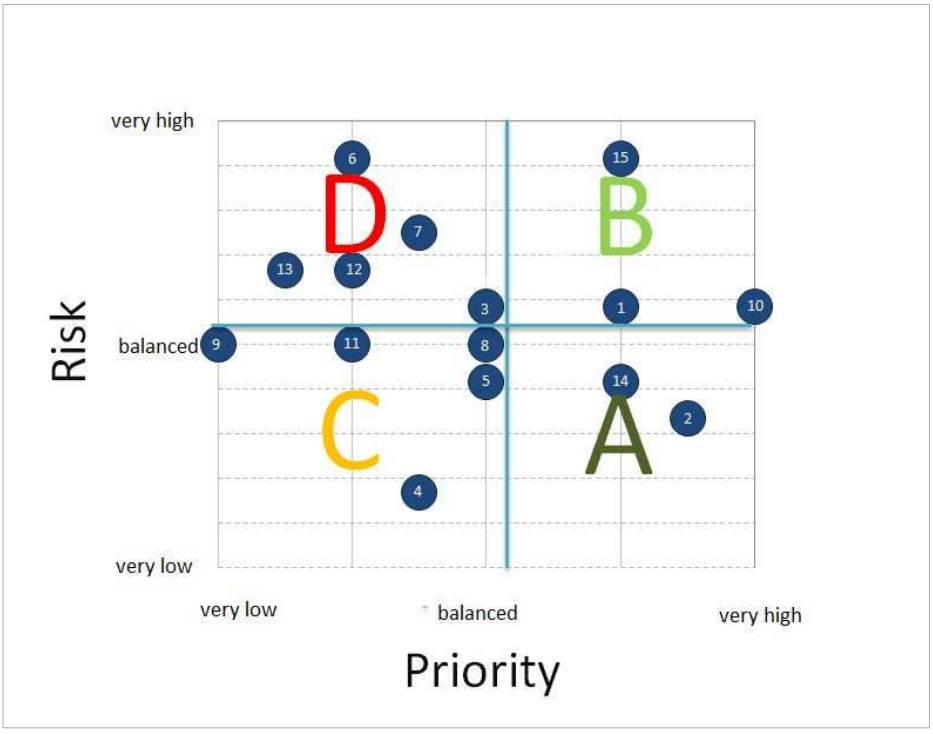

Figure 9: Priority-Risk classification

3.6 Moldavia

Class	Nr	Action/Service	Priority	Risk	Current Status	Main Focus
A	1	Access to static road data	very high	balanced	n.a.	urban network
	2	Access to dynamic road data	very high	balanced	n.a.	Urban network
	3	Access to public transport data via an harmonised interface	very high	balanced	n.a.	rail, PT
	4	Access to information on charging points for alternative fuel vehicles	very high	balanced	n.a.	motorways, urban network
	5	Provision of multimodal traveller information services	very high	balanced	n.a.	road, PT, rail
	6	Integrated, electronic fare management (local, national or trans-national)	very high	balanced	n.a.	multimodal
	8	Services for people with special needs	very high	balanced	n.a.	-
	9	Provision of historic traffic data	very high	balanced	n.a.	-
	10	Intelligent Truck Parking	very high	balanced	n.a.	motorways, secondary road network, urban network
	11	Services for Tracking and Tracing of Goods	very high	balanced	n.a.	-
	12	Electronic consignment notes (Improving customs as well as access to data for 3rd parties)	very high	rather low	n.a.	-
	14	Probe Vehicle Data	very high	very low	n.a.	motorways, secondary road network, urban network
C	7	Vehicle sharing concepts (car sharing, carpooling, bike sharing, etc.)	balanced	balanced	n.a.	urban
	13	Intelligent tolling services (dynamic tolling)	balanced	balanced	n.a.	motorways, secondary road network, urban network
D	15	C-ITS (Cooperative Systems)	balanced	rather high	n.a.	motorways, secondary road network, urban network

Table 7: Priority-Risk classification, current status and main focus of ITS in Moldavia

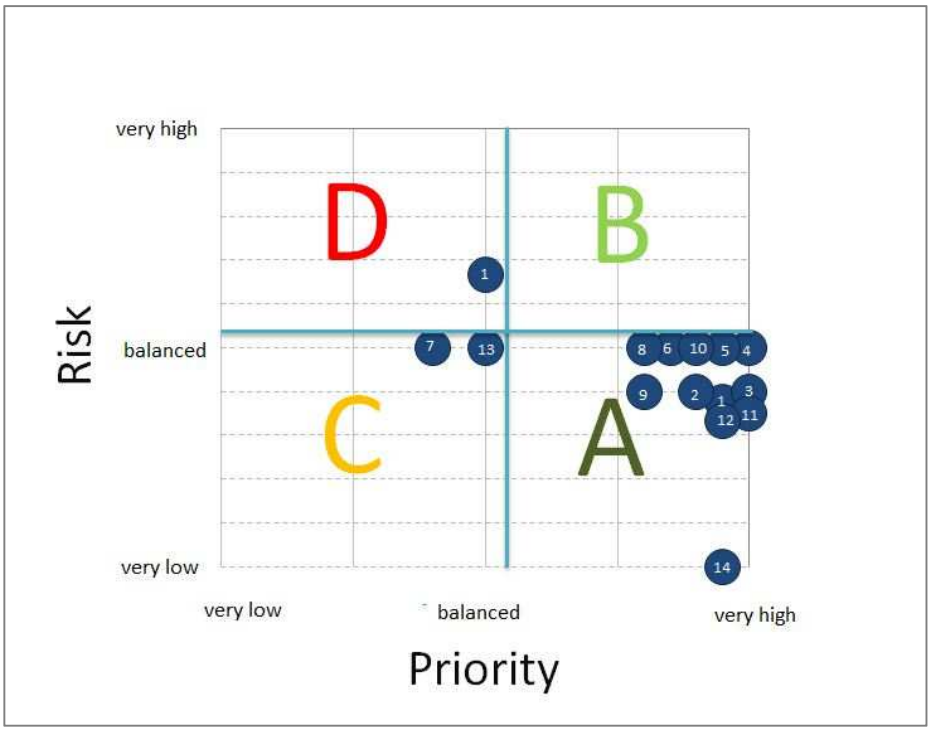

Figure 10: Priority-Risk classification

3.7 Romania

Class	Nr	Action/Service	Priority	Risk	Current Status	Main Focus
A	2	Access to dynamic road data	high	balanced	n.a.	motorways (urban network)
B	1	Access to static road data	high	rather high	n.a.	motorways (urban network)
C	14	Probe Vehicle Data	balanced	very low	n.a.	motorways, secondary road network, urban network
	7	Vehicle sharing concepts (car sharing, carpooling, bike sharing, etc.)	very low	balanced	n.a.	urban areas
	13	Intelligent tolling services (dynamic tolling)	very low	balanced	n.a.	motorways
D	4	Access to information on charging points for alternative fuel vehicles	low	rather high	n.a.	urban network
	6	Integrated, electronic fare management (local, national or trans-national)	low	rather high	n.a.	single mode
	8	Services for people with special needs	very low	rather high	n.a.	-
	3	Access to public transport data via an harmonised interface	low	high	n.a.	PT
	5	Provision of multimodal traveller information services	low	high	n.a.	PT, rail
	9	Provision of historic traffic data	low	high	n.a.	
	10	Intelligent Truck Parking	low	high	n.a.	motorways
	11	Services for Tracking and Tracing of Goods	very low	high	n.a.	-
	12	Electronic consignment notes (Improving customs as well as access to data for 3rd parties)	very low	high	n.a.	-
	15	C-ITS (Cooperative Systems)	low	very high	n.a.	motorways, urban network

Table 8: Priority-Risk classification, current status and main focus of ITS in Romania

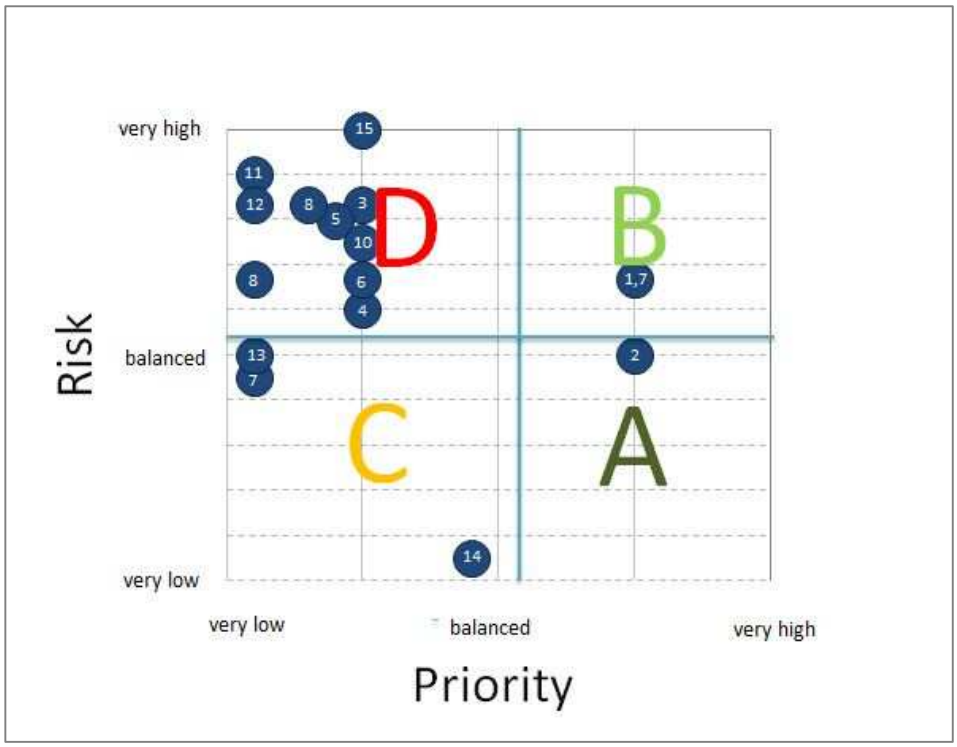

Figure 11: Priority-Risk classification

3.8 Czech Republic

Class	Nr	Action/Service	Priority	Risk	Current Status	Main Focus
A	3	Access to public transport data via an harmonised interface	very high	very low	planned/ in preparation	rail, PT, bus
	5	Provision of multimodal traveller information services	very high	very low	fully deployed on national level	all modes
	14	Probe Vehicle Data	very high	very low	partly deployed	motorways, secondary road network, urban network
C	4	Access to information on charging points for alternative fuel vehicles	very low	very low	not planned	motorways, secondary road network, urban network
	7	Vehicle sharing concepts (car sharing, carpooling, bike sharing, etc.)	very low	very low	in progress/in development	urban, regional
	8	Services for people with special needs	very low	very low	partly deployed	-
	9	Provision of historic traffic data	very low	very low	no information	-
	11	Services for Tracking and Tracing of Goods	very low	very low	no information	-
	1	Access to static road data	balanced	balanced	planned/ in preparation	motorways, secondary road network, urban network
	12	Electronic consignment notes (Improving customs as well as access to data for 3rd parties)	balanced	balanced	no information	-
	13	Intelligent tolling services (dynamic tolling)	balanced	balanced	no information	motorways
	15	C-ITS (Cooperative Systems)	balanced	balanced	no information	motorways, secondary road network, urban network
	10	Intelligent Truck Parking	very low	balanced	no information	motorways, secondary road network, urban network
D	2	Access to dynamic road data	balanced	rather high	planned/ in preparation	motorways, secondary road network, urban network
	6	Integrated, electronic fare management (local, national or trans-national)	very low	rather high	in progress/in development	multimodal

Table 9: Priority-Risk classification, current status and main focus of ITS in Czech Republic

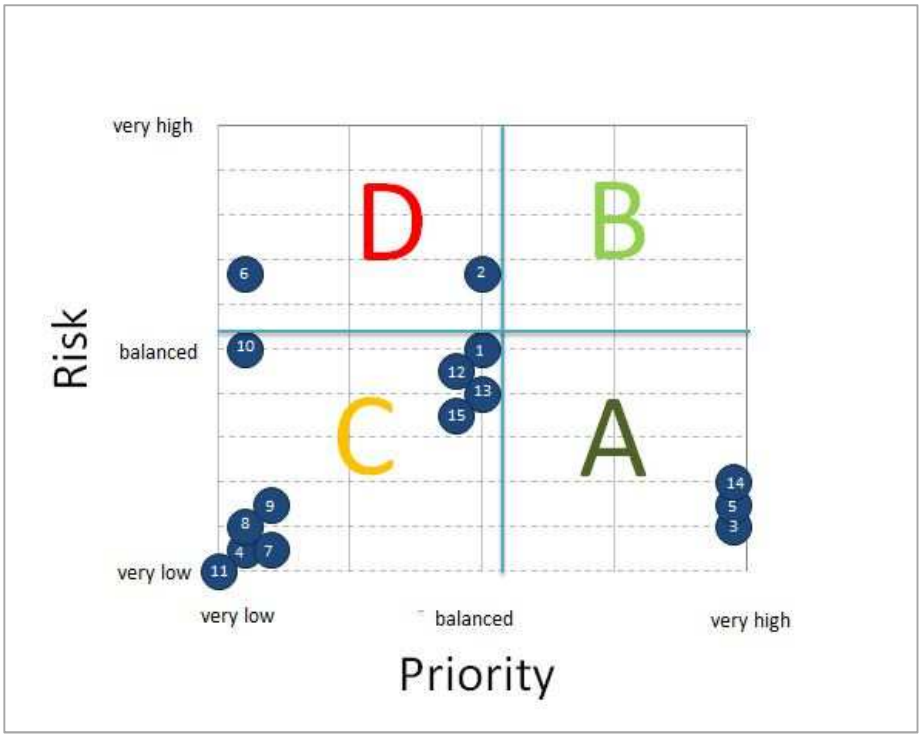

Figure 12: Priority-Risk classification

4 ITS ROADMAP

4.1 Premise of the roadmap

Prior to the stakeholder survey a set of preconditions were defined in the EUSDR Workshop in Vienna, which should set the framework for the survey and the subsequent roadmap. The following premises were formulated, which describe more or less the focus of the ITS roadmap in terms of ITS deployment.

1 Focus on the comprehensive infrastructure network

Notwithstanding that the *Directive 2010/40/EU*[3] *(i.e. Directive of the European Parliament and the Council on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport)* is mainly focused on the primary road network the main interest in the Danube Region roadmap is to extend the priority actions of the ITS directive to the comprehensive infrastructure network. Particularly the focus of the Danube Region priorities is extended to urban networks and secondary infrastructure network.

Focussing on urban networks is inherently contained in the scope and definition of Action No. 7 of the Danube Region Strategy, namely "to develop further Intelligent Traffic Systems by using environmental friendly technologies, especially in urban regions". Moreover, the Danube Region Strategy emphasis the relevance of good, inter-linked and sustainable transport systems and its effective use, which can only be achieved by extending all efforts also to the comprehensive infrastructure network.

2 Focus on the quality level of mobility services

In the area of mobility services the quality of the provided services is essential for the user acceptance and the sustainable application. Therefore, particular emphasis is put on quality of services to be deployed - in particular in passenger transport - which should follow a set of minimum criteria. Quality is also one of the principles (of the EC directive) ITS measures should follow, in particular in timing and positioning in order to achieve a level of precision that is required for the purposes of ITS applications and services.

3 Focus on freight and logistics services

It has been agreed, that aside of multimodal passenger services, freight and logistic are a crucial priority for the Danube Region. The Danube Region Strategy is asking for the development of more transport and trade links in the Region. While trade and freight transport is going to be intensified in the Danube Region, the crucial scope of the roadmap is the provision of high-quality and intelligent framework conditions for freight transport, also on the road.

[3] http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32010L0040

4.2 Priority-Risk Classification of ITS Services in EUSDR Countries

In order to achieve a common ITS roadmap for the Danube Region a ranking is done on the priority-risk classification in the single countries. The table below shows the results from the national perspective on ITS priorities. This table is used to rank the ITS services/measures accruing to the frequency of high-priority and low-priority classes.

Nr	ITS-Service	Slovenia	Austria	Hungary	Croatia	Germany	Moldavia	Romania	Czech R.
1	Access to static road data	C	A	D	B	B	A	B	C
2	Access to dynamic road data	D	B	B	B	A	A	A	D
3	Access to public transport data via an harmonised interface	B	A	B	B	D	A	D	A
4	Access to information on charging points for alternative fuel vehicles	C	A	D	D	C	A	D	C
5	Provision of multimodal traveller information services	B	A	B	B	C	A	D	A
6	Integrated, electronic fare management (local, national or trans-national)	D	B	B	B	D	A	D	D
7	Vehicle sharing concepts (car sharing, carpooling, bike sharing, etc.)	D	C	C	D	D	C	C	C
8	Services for people with special needs	C	A	C	B	C	A	D	C
9	Provision of historic traffic data	D	A	C	C	C	A	D	C
10	Intelligent truck parking	B	A	B	D	B	A	D	C
11	Services for tracking and tracing of goods	D	A	D	B	C	A	D	C
12	Electronic consignment notes (Improving customs as well as access to data for 3rd parties)	D	A	B	B	D	A	D	C
13	Intelligent tolling services (dynamic tolling)	D	D	D	B	D	C	C	C
14	Probe vehicle data	C	B	A	D	A	A	C	A
15	C-ITS (Cooperative Systems)	D	B	D	D	B	D	D	C

Table 10: Overview of priority-risk classification from national perspective

4.3 ITS Deployment Roadmap – Ranking of ITS Measures/Services for the Danube Region

	Priority Area		ITS Measures/Services	Proportion of EUSDR countries	
				high priority	low priority
Deployment recommended	1	2	Access to dynamic road data	75%	25%
		3	Access to public transport data via an harmonised interface		
		5	Provision of multimodal traveller information services		
	2	1	Access to static road data	63%	38%
		10	Intelligent truck parking		
		14	Probe vehicle data		
	3	6	Integrated, electronic fare management (local, national or trans-national)	50%	50%
		12	Electronic consignment notes (Improving customs as well as access to data for 3rd parties)		
Deployment not recommended at present state	4	8	Services for people with special needs	38%	63%
		11	Services for tracking and tracing of goods		
	5	4	Access to information on charging points for alternative fuel vehicles	25%	75%
		9	Provision of historic traffic data		
		15	C-ITS (Cooperative Systems)		
	6	13	Intelligent tolling services (dynamic tolling)	13%	88%
	7	7	Vehicle sharing concepts (car sharing, carpooling, bike sharing, etc.)	0%	100%

4.3.1 Priority Area 1 (for 75% of the EUSDR countries of high priority)

Priority Area
1
Deployment recommended

Action 1-1 Access to dynamic road data

Making available and accessible existing and accurate real-time road data. Such data include real-time traffic condition, as well as information on incidents (e.g. accidents, weather warnings) and other events (e.g. road works, construction sites, road blocks, etc.).

They can be used for real-time traffic information services and dynamic route information and other systems by public or ITS service providers. As a wide range of public and private parties are involved in the collection of road data, respectively traffic and traffic management information, data exchange and accessibility as well as interoperable (and machine-readable) data formats are getting increasing importance. The provision of real-time traffic information services is an explicit *Priority Area B of the ITS Directive COM 2010/40/EU (Directive of the European Parliament and the Council on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport).*

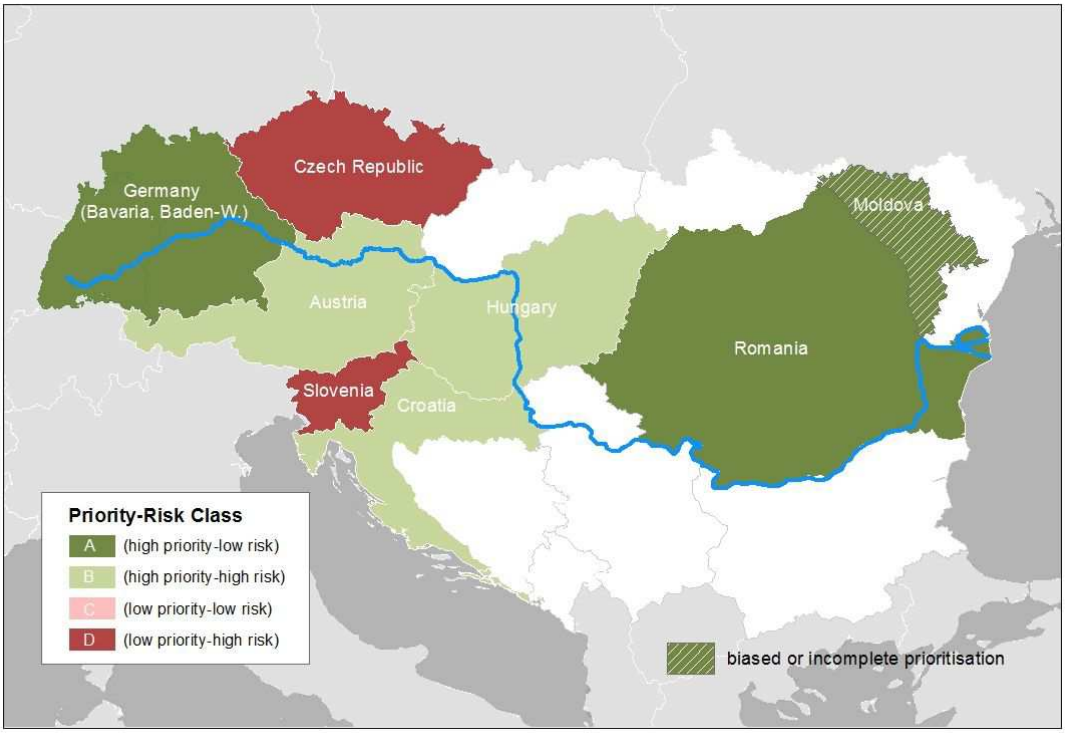

Figure 13: *Action 1 "Access to dynamic road data"*

Priority-Risk classification in the EUSDR region

Action 1-2 Access to public transport data via a harmonised interface

Provision and/or exchange of public transport data in a format that enables interoperability. Such data are static data, like timetables, transport graphs, location of stations and stops (train, tram or bus), in some cases also fare products and price structure, but also to dynamic real-time service status information (e.g. time of arrival and departure, service disruption, position of vehicles, delays and status of elevators, escalators).

The availability of public transport data can lead to an increase in the number of travel information products and to a harmonisation of passenger information which is a major task in relation to *Priority Area A of the ITS Directive COM 2010/40/EU (Directive of the European Parliament and the Council on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport).*

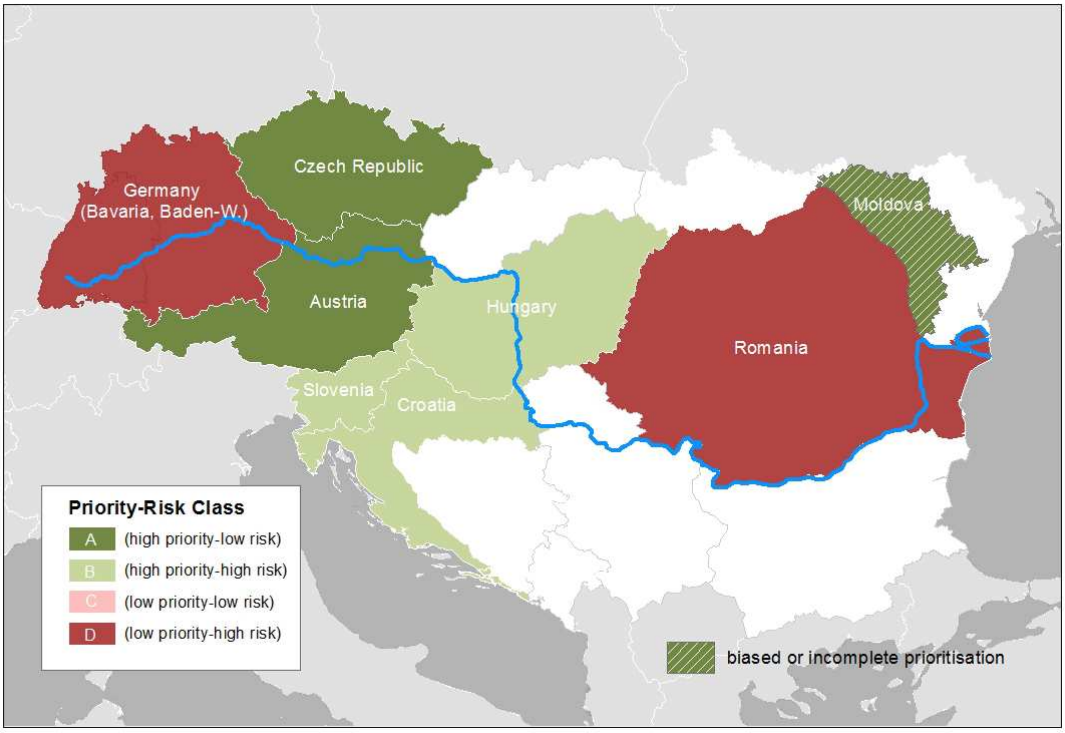

Figure 14: *Action 1-2 "Access to public transport data via a harmonised interface"*

Priority-Risk classification in the EUSDR region

Action 1-3 Provision of multimodal traveller information services

Multi-modal travel planning is regarded as a key element of ITS deployment (Priority Action A of the IST Directive COM 2010/40/EU. It provides the traveller with comprehensive door-to-door information allowing for well-informed travel decisions. It seamlessly integrates information for different modes, based on a strong backbone of rail and local public transport.

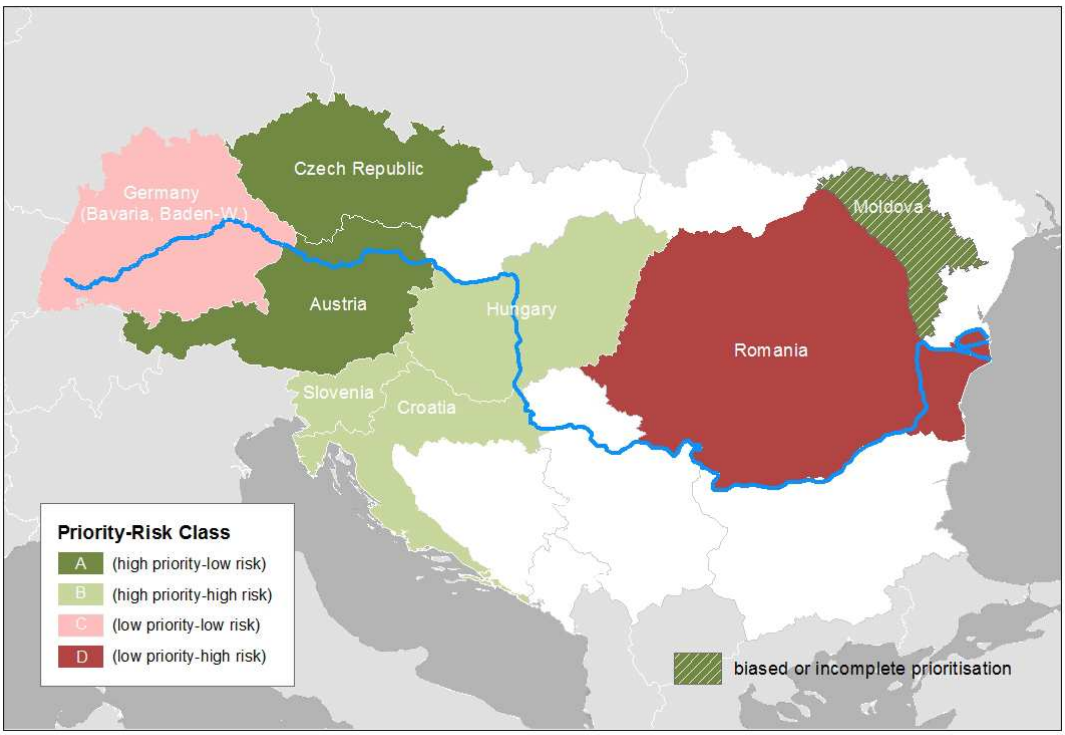

Figure 15: *Action 1-3 "Provision of multimodal traveller information services"*

Priority-Risk classification in the EUSDR region

4.3.2 Priority Area 2 (for 63% of the EUSDR countries of high priority)

Priority Area 2 Deployment recommended

Action 2-1 Access to static road data

Provision of static road or transportation data (e.g. digital maps on transportation network, directed graphs of the road network, but also data about road type, road condition, traffic regulations, speed limits, accident hotspots, other safety related locations, etc.), also to third parties.

Such data are the basis for the provision of safety related traffic information (as targeted with *Reg. 886/213).* Furthermore, data on the road network are basic geo-data which are needed for establishing an infrastructure for spatial Information (as required in the *INSPIRE Directive 2007/2/EC*).

Figure 16: *Action 2-1 "Access to static road data"*

Priority-Risk classification in the EUSDR region

Action 2-2 intelligent truck parking

This service gives truck drivers access to information on the availability of secure parking places for their trucks.

Secure parking places for trucks and commercial vehicles is listed as a top priority in the ITS Action Plan and the ITS Directive *(Priority Area E and F of the ITS Directive COM 2010/40/EU* and *Reg. 885/2013*) This service gives truck drivers access to information on the availability of secure parking places for their trucks as well as the possibility to make use of a timely pre- and on-trip reservation service.

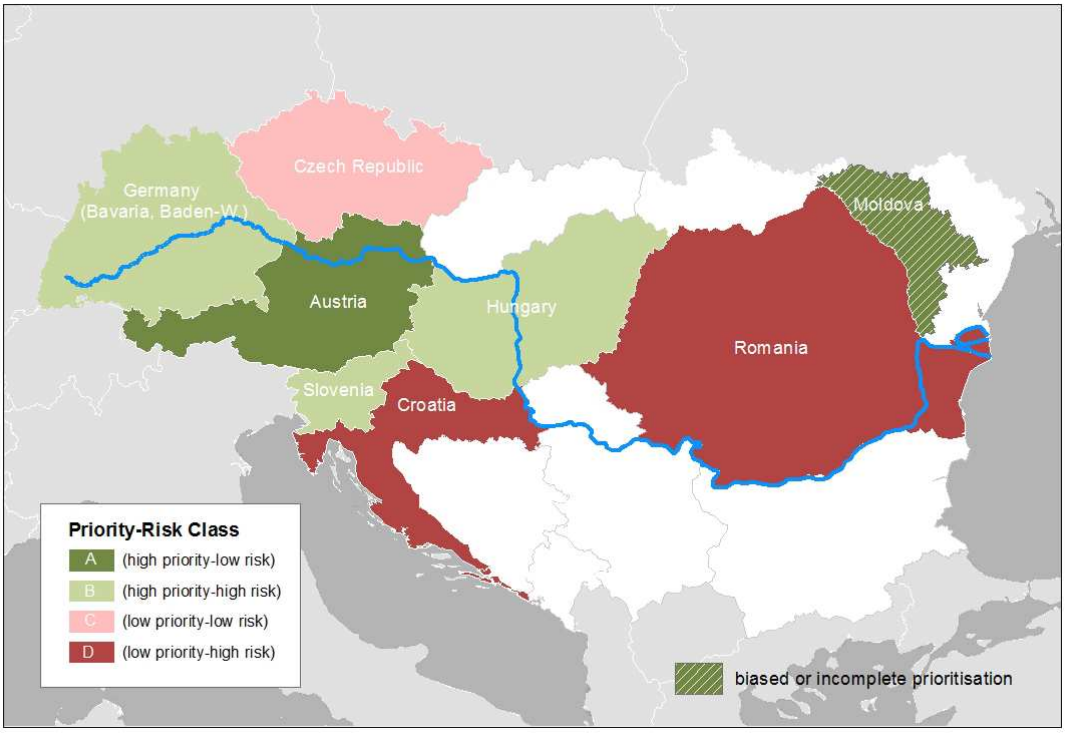

Figure 17: *Action 2-2 "Access to static road data"*

Priority-Risk classification in the EUSDR region

Action 2-3 Probe vehicle data

Vehicle Probe data (e.g. floating car data from private car, taxis or transport fleets, floating cellular data from private operators, etc.) are the basis for real-time travel time data collection, real-time traffic operations monitoring, incident detection, and route guidance applications and others applications.

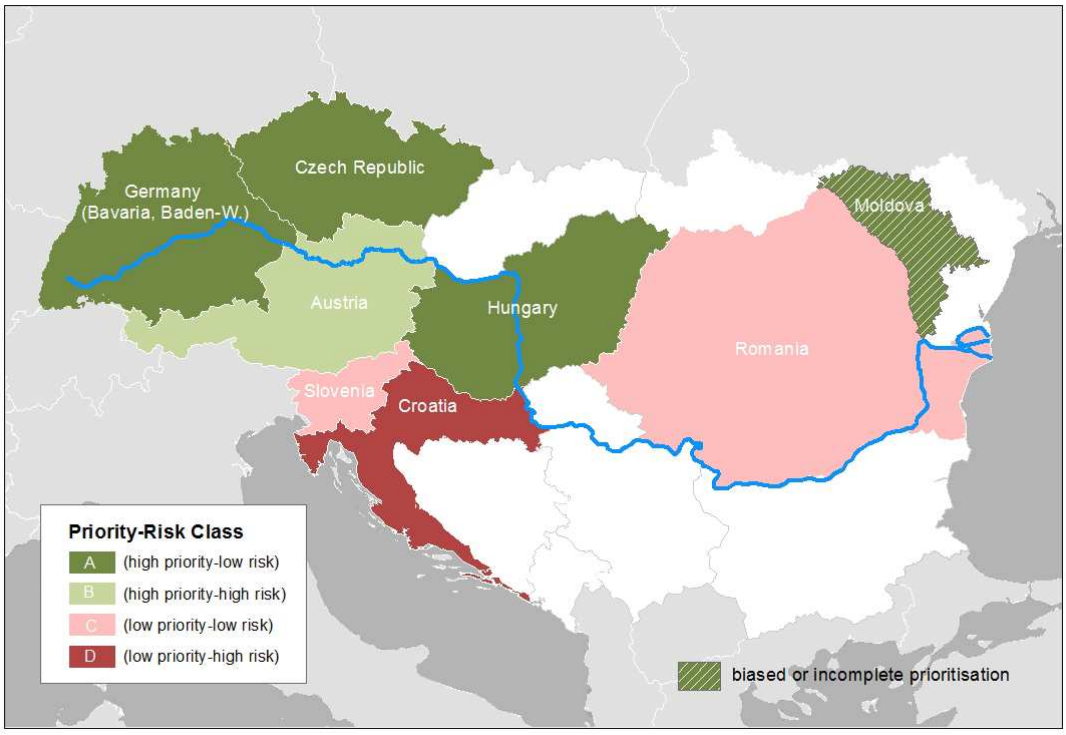

Figure 18: *Action 2-3 "Probe vehicle data"*

Priority-Risk classification in the EUSDR region

4.3.3 Priority Area 3 (for 50% of the EUSDR countries of high priority)

Priority Area
3
Deployment recommended

Action 3-1 Integrated, electronic fare management (local, national or trans-national)

Integrated, electronic fare management enables a traveller to make a journey that involves transfers within or between different transport modes with a single ticket that is valid for the complete journey.

It is based on automated fare collection systems of a public transportation network (a collection of components that automate the ticketing system) which is the basis for an integrated ticketing across different transport operators and/or transport modes. Integrated fare management is therefore regarded as key element for intermodality and interoperability.

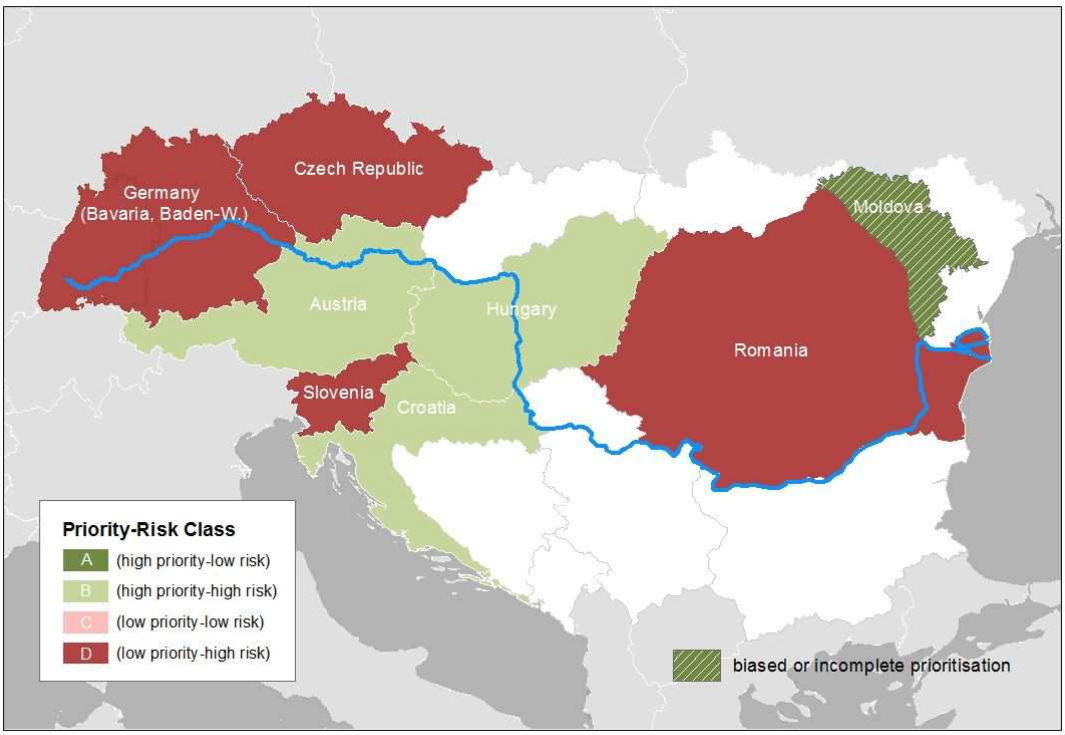

Figure 19: *Action 3-1 "Integrated, electronic fare management"*

Priority-Risk classification in the EUSDR region

Action 3-2 Electronic consignment notes (Improving customs as well as access to data for 3rd parties)

Introduction of electronic consignment notes in road transport, as well as integrated new services using electronic consignment notes for improved and fast customs. In order to provide new services the access to third parties (like ITS service developers) is required.

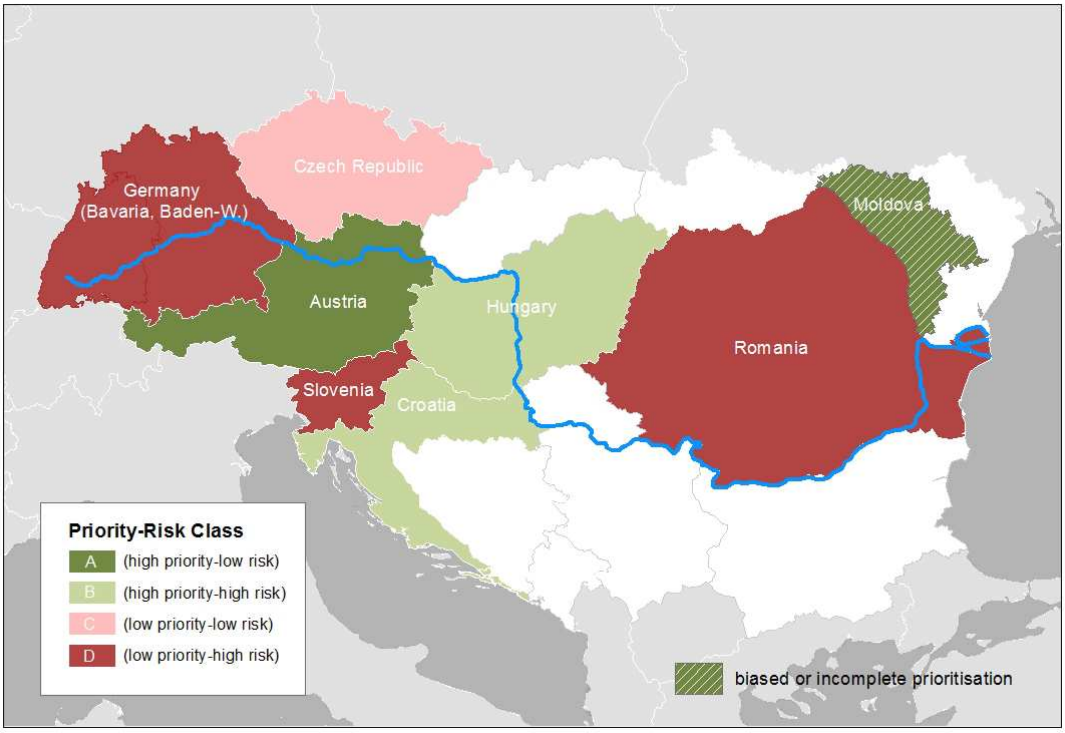

Figure 20: *Action 3-2 "Electronic consignment notes"*

Priority-Risk classification in the EUSDR region

4.3.4 Priority Area 4 (for 38% of the EUSDR countries of high priority)

Priority Area

4

Deployment not recommended at present state

Action 4-1 Services for people with special needs

Services for persons with reduced mobility, for disabled persons or other special needs. European legislation gives people with reduced mobility rights related to the special needs in transportation. Such special needs can also be regarded in the field of ITS (e.g. in travel information systems, route planners or by providing special assistance in public transport, airports, railway stations, etc. by the use of ICT with the objective to improve the accessibility of transport means and any many others).

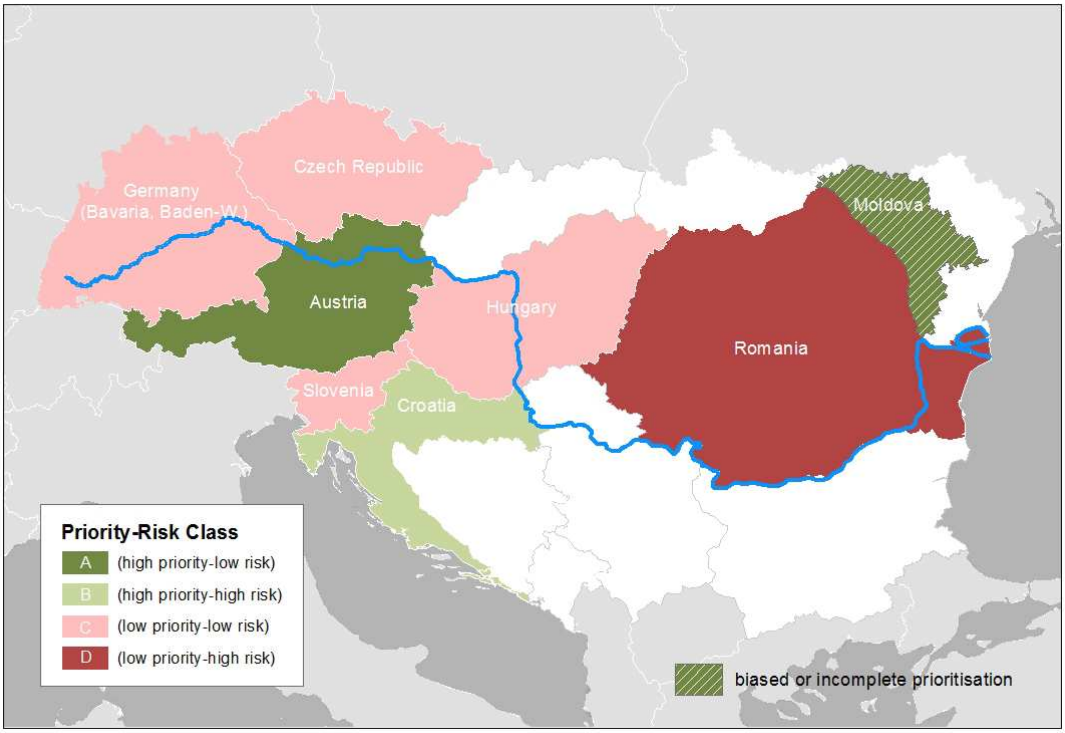

Figure 21: *Action 4-1 "Services for people with special needs"*

Priority-Risk classification in the EUSDR region

Action 4-2 Services for tracking and tracing of goods

ITS technologies are essential for the introduction of e-Freight services that give information on the location and condition of transported goods in a secure way (Freight Transport Logistics Action Plan - COM 2007/1321). In most of the cases services for tracking and tracing of goods are related to the transportation of dangerous/hazardous goods and/or live animals.

Such services can support transport operators as well as public authorities (e.g. road operators, emergency services, administration like city or environmental authorities).

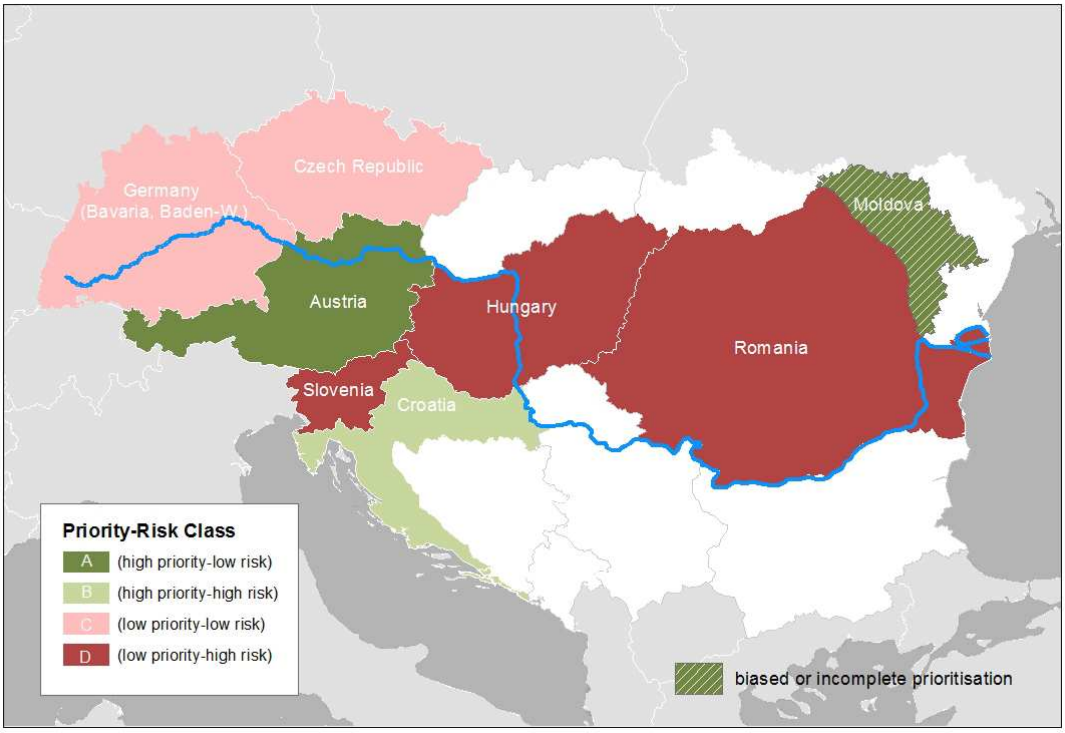

Figure 22: *Action 4-2 "Services for tracking and tracing of goods"*

Priority-Risk classification in the EUSDR region

4.3.5 Priority Area 5 (for 25% of the EUSDR countries of high priority)

Priority Area

5

Deployment not recommended at present state

Action 5-1 Access to information on charging points for alternative fuel vehicles

Collection and provision of data and information about the availability of charging infrastructure (loading stations, charging points) for alternative fuels (like electricity, hydrogen and natural gas (CNG and LNG) also to third parties.

This is an important factor for the successful market introduction of alternative vehicles or even alternative fleets. This action is considered against the background of the Commission's efforts to promote market development of alternative fuels as well as the envisioned build-up of a minimum infrastructure (e.g. *ITS Directive COM 2013/18/EU* of the European Parliament and of the Council on the deployment of alternative fuels infrastructure and others.)

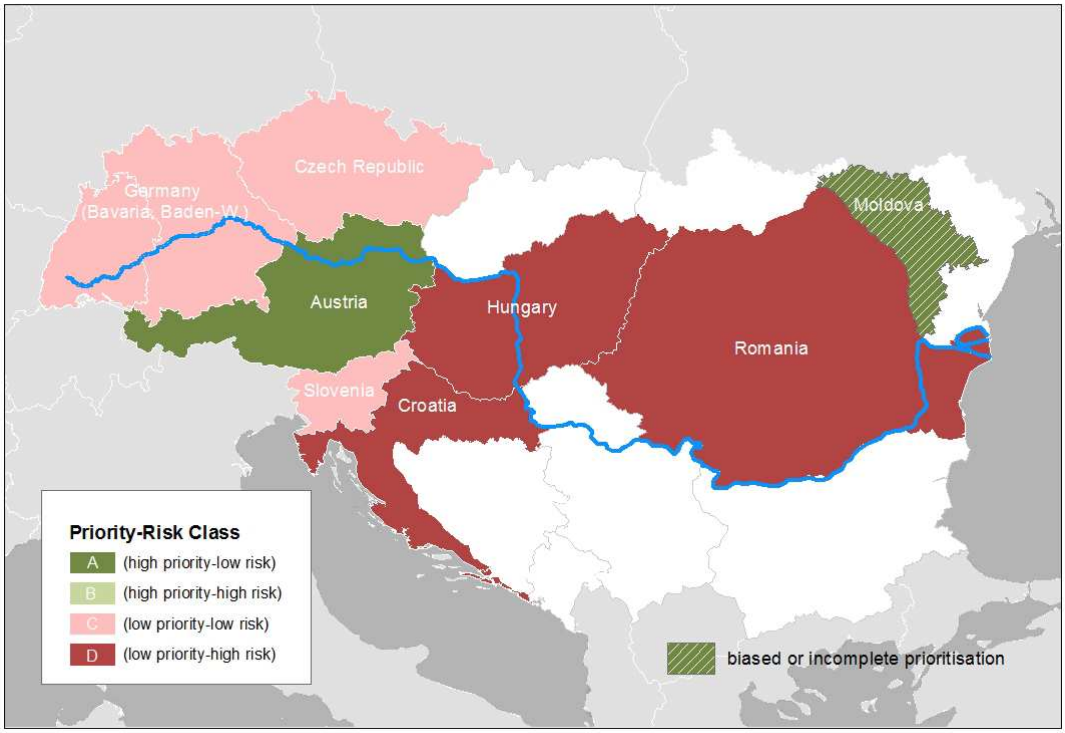

Figure 23: *Action 5-1 "Access to information on charging points for alternative fuel vehicles"*

Priority-Risk classification in the EUSDR region

Action 5-2 Provision of historic traffic data

Provision of historic data, i.e. data from freight operators or data gained by in-vehicle devices, like origin, destination, goods class, form of conveyance, vehicle type and many others. Such data can be used for freight transport modelling by authorities and for the improvement of traffic information services.

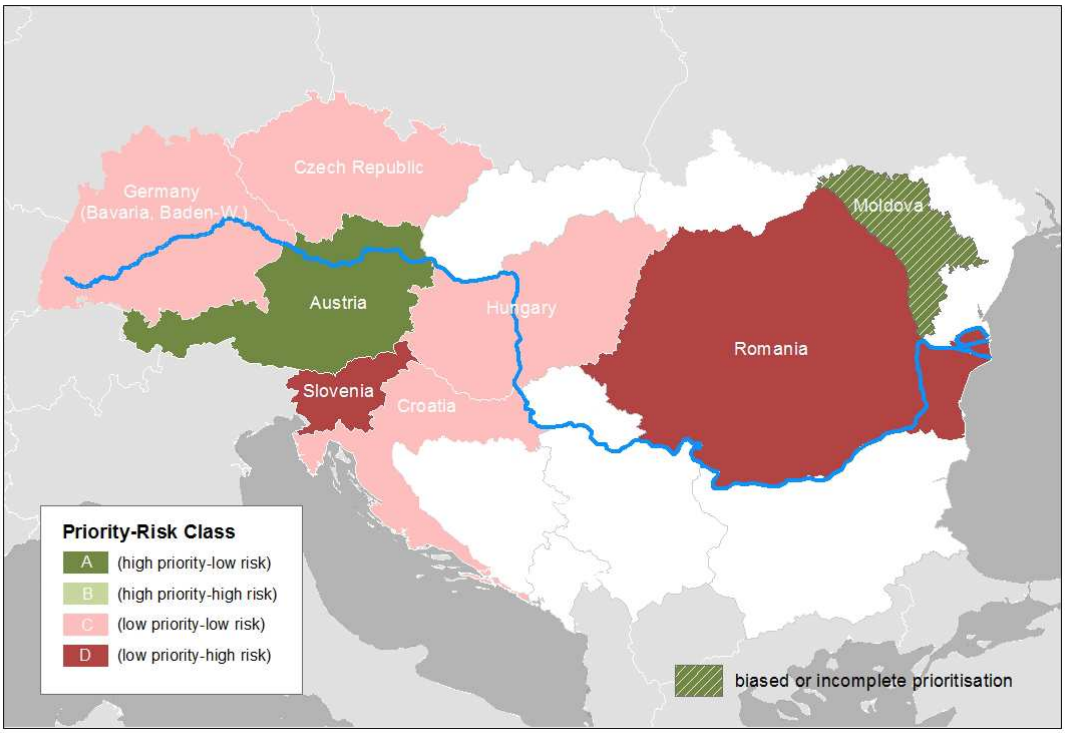

Figure 24: *Action 5-2 "Provision of historic traffic data"*

Priority-Risk classification in the EUSDR region

Action 5-3 C-ITS (Cooperative Systems)

Technologies that are linking the vehicles to other vehicles and also vehicles to infrastructure.

Figure 25: *Action 5-3 "C-ITS"*

Priority-Risk classification in the EUSDR region

4.3.6 Priority Area 6
(for 13% of the EUSDR countries of high priority)

Priority Area
6
Deployment not recommended at present state

Action 6-1 intelligent tolling services (dynamic tolling)

Tolling services that consider additional information, like data on the traffic conditions. With dynamic pricing, tolls can be continually adjusted according to traffic conditions to maintain a free-flowing level of traffic.

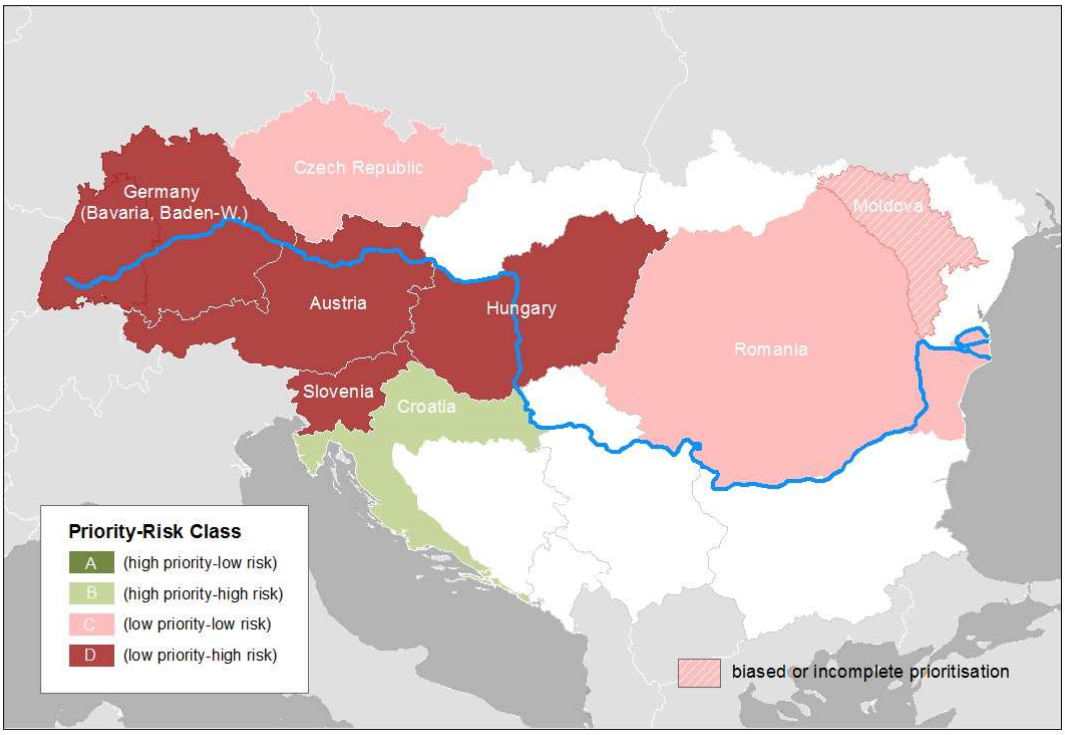

Figure 26: *Action 6-1 "Intelligent tolling services"*

Priority-Risk classification in the EUSDR region

4.3.7 **Priority Area 7**
(for 0% of the EUSDR countries of high priority)

Priority Area
7
Deployment not recommended at present state

Action 7-1 Vehicle sharing concepts (car sharing, carpooling, bike sharing, etc.)

Introduction and promotion of any vehicle sharing concepts (including bicycles) as alternative or additional concept to private car usage.

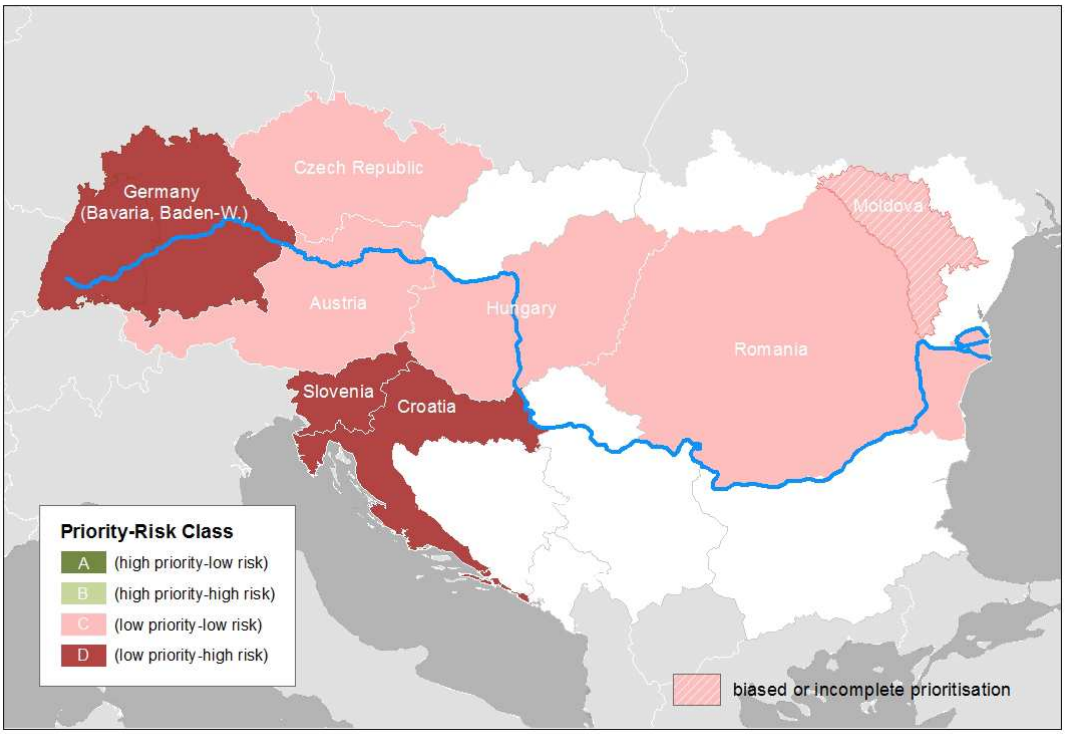

Figure 27: *Action 7-1 "Vehicle sharing concepts"*

Priority-Risk classification in the EUSDR region