



Combined Requirements for Co-operative Systems

Annex 3: COOPERS Services

Issue 2

June 2008

	Projects supported by European Union DG INFSO IST-2004-2.4.12 eSafety – Cooperative systems for road transport		
	Project References	COMeSafety: COOPERS: FP6-2004-IST-4-026814-IP	CVIS: FP6-2004-IST-4-027293-IP SAFESPOT: FP6-2004-IST-4-026963-IP
IP Managers	COMeSafety	Rudolf Mietzner, Softlab Group Tel: +49 89 9936 1216, E-mail: mietzner@comesafety.org	
	COOPERS	Dipl.-Ing. Alexander Frötscher, AustriaTech Tel ++43/1/26 33 444-64, E-mail: alexander.froetscher@austriatech.org	
	CVIS	Paul Kompfner, ERTICO – ITS Europe, Tel: +32 2 400 0700, E-mail: cvis@mail.ertico.com	
	SAFESPOT	Ing. Roberto Brignolo - Centro Ricerche FIAT, Tel: +39.011.90.80534, E-mail: roberto.brignolo@crf.it	

Table of Contents

1.	INTRODUCTION	1
1.1	THIS ANNEX	1
1.2	ORGANISATION OF THIS ANNEX	1
2.	COOPERS SERVICES	2
2.1	INTRODUCTION	2
2.2	ACCIDENT/INCIDENT/WRONG-WAY WARNING (S1A/S1B/S1C)	2
2.3	WEATHER CONDITION WARNING (S2)	2
2.4	ROADWORK INFORMATION (S3)	2
2.5	LANE UTILIZATION INFORMATION (S4A/S4B/S4C)	2
2.6	VARIABLE SPEED LIMIT INFORMATION (S5)	3
2.7	TRAFFIC CONGESTION WARNING (S6)	3
2.8	ISA WITH INFRASTRUCTURE LINK (S7)	3
2.9	INTERNATIONAL SERVICE HANDOVER (S8)	3
2.10	ROAD CHARGING TO INFLUENCE DEMAND (S9)	4
2.11	ESTIMATED JOURNEY TIME (S10)	4
2.12	RECOMMENDED NEXT LINK (S11)	4
2.13	MAP INFORMATION CHECK (S12)	4
2.14	FLOATING CAR DATA (S13)	5
2.15	SERVICE ACKNOWLEDGEMENT	5
3.	ALLOCATION OF USER NEEDS	6
4.	FURTHER DEFINITIONS	41

Tables

Table 1	Allocation of existing and new FRAME User Needs to COOPERS Services	1
Table 2	Allocation of new FRAME User Needs to COOPERS Services	34

Abbreviations and Definitions

Abbreviation	Definition
FRAME	The short name for the European ITS Framework Architecture
MoU	Memorandum of Understanding
TIC	Travel Information Centre
TCC	Traffic Control Centre
VRU	Vulnerable Road User
XFCD	Extra Floating Car Data

1. Introduction

1.1 This Annex

This Annex provides descriptions of all the Services from the COOPERS Project that have been mapped to the FRAME User Needs. As noted in section 5.4 of the Main Document, the Requirements have been obtained from parts of the documents identified in reference 8(a) also listed in that Document. They are presented in this Annex to ensure that their identities and descriptions are known in case changes are made in after the completion of the work described in this document, the Main Document and the other Annexes.

1.2 Organisation of this Annex

The rest of this Annex is arranged as a single Chapter. This contains a description of each of the COOPERS Services to which FRAME User Needs have been mapped.

2. COOPERS Services

2.1 Introduction

The following sections in this Chapter provide a description of each of the Services that have been created by the COOPERS Project.

2.2 Accident/Incident/Wrong-way Warning (S1a/S1b/S1c)

The objective of this Service is to warn approaching drivers of an accident/incident ahead and to warn drivers of oncoming wrong-way drivers with in-vehicle, dynamic information. The Service has also to inform Service operators for efficiency emergency operation.

The following COOPERS Services may need to be operated parallel with the accident/incident Service:

- Traffic Congestion Warning (S6)
- Variable Speed Limit Information (S5)
- Lane Utilization Information (S4a/S4b/S4c)

In addition specific infrastructure and vehicle sensor data will also be needed.

2.3 Weather Condition Warning (S2)

The objective of this Service is to increase driving safety by making drivers aware of environmentally related problems ahead and so as to be prepared for hazardous driving conditions.

2.4 Roadwork Information (S3)

The objective of this Service is to increase driving safety by making drivers aware of roadwork conditions ahead.

2.5 Lane Utilization information (S4a/S4b/S4c)

The main objectives of this Service are to provide drivers with real-time information about lane keeping, lane banning and lane utilisation to auxiliary lanes.

- Lane banning (S4a): providing the driver information about lanes which are not accessible according to the type of vehicle and the network link, e. g. on HGV are not allowed to drive on the off-side lane on motorways or dedicated lanes for HOV or public transport are not open for every vehicle.
- Lane keeping (S4b): providing advices for drivers on a specific road link to keep in lane and to avoid lane change to stabilise traffic conditions and to reduce speed variation.
- Auxiliary lane (S4c): providing information to drivers about the availability of auxiliary lanes for emergency stopping or driving on a specific motorway

section. For realizing this Service it is important to have a clear understanding of the traffic conditions on this road network section.

2.6 Variable Speed Limit Information (S5)

The objective of this Service is to provide the driver information of speed limit for each link of the travelled road based on the current condition of traffic, road and weather. The Service will be consists of many data sources and complex algorithms. An important effect of this regulating information system is to reduce difference in speed limit between sections to reduce the severity of traffic shockwaves.

The following COOPERS Services may need to be operated parallel with the in-vehicle variable speed limit information Service:

- Weather Condition Warning (S2)
- Traffic Congestion Warning (S6)
- Accident/Incident/Wrong-way driver Warning (S1a/S1b/S1c)
- Lane Utilization Information (S4a/S4b/S4c)

In addition the information from already existing systems like MAYDAY and eCALL will also be needed.

2.7 Traffic Congestion Warning (S6)

The objective of this Service is to improve road safety by making drivers aware of congested traffic conditions ahead so that they can be prepared for hazardous driving conditions.

This COOPERS Service needs the output data from the following other COOPERS Services:

- Variable Speed Limit Information (S5)
- Lane Utilization Information (S4a/S4b/S4c)

In addition specific sensor data from the infrastructure sites will also be needed.

2.8 ISA with Infrastructure Link (S7)

This Service should inform/warn drivers of vehicle speed limit and help them to match their speed to prevailing traffic/road conditions. This COOPERS Service needs the output data from the COOPERS Variable Speed Limit Information Service (S5) and also vehicle specific sensor data.

2.9 International Service Handover (S8)

This Service enables drivers to access road condition and traffic information of a neighbouring country and/or road operators before crossing border or changing operator areas, and to ensure continuity and quality of Services provided for international travellers.

2.10 Road Charging to Influence Demand (S9)

The aim of this Service is to demonstrate Electronic Fee Collection (EFC) which offers the possibility of charging road vehicles in a more flexible way by informing the drivers about predicted costs. It is expected that safety will be improved from reduced traffic demands and congestion. This Service needs information about the pricing strategy from external EFC provider or external provider optional, also the specific vehicle data will be needed.

The idea behind this Service is to support the EFC providers with a more flexible fee collect system, this means that the "COOPERS fee database" consists only of a set of ID's and contain no vehicle specific data.

2.11 Estimated Journey Time (S10)

This real-time estimated journey time Service is a part of route navigation which is used to help drivers to plan their trips (either before or during the trips) based on the calculated estimated journey time.

This Service needs the output data from the following other COOPERS Services:

- Variable Speed Limit Information (S5)
- Traffic Congestion Warning (S6)

2.12 Recommended Next Link (S11)

This Service is also a part of route navigation which is used to help drivers reach their final destination through turn-by-turn guidance in case of alternative links in special situations/scenarios. This Service needs the output data from the following other COOPERS Services:

- Variable Speed Limit Information (S5)
- Traffic Congestion Warning (S6)
- Accident/Incident/Wrong-way driver Warning (S1a/S1b/S1c)
- Weather Condition Warning (S2)
- Roadwork Information (S3)
- Lane Utilization Information (S4a/S4b/S4c)

In additional event data from the Police or other external Service provider will also be needed.

2.13 Map Information Check (S12)

The map information check should be used to inform and update network information stored in the OBU.

2.14 Floating Car Data (S13)

This Service provides extra Floating Car Data (xFCD) for use by the other Services. The data is obtained from the vehicle and as well as including information about the vehicle's speed and location can also include other information, such as the weather and the state of the road surface over which the vehicle is passing.

2.15 Service Acknowledgement

An additional requirement that has been identified is to provide means to ensure that drivers receive specific messages from the infrastructure. This is the required for all Services that give or plan to give legal advice such as variable speed limit and lane banning instructions. Furthermore, as the ISA Service is planned to provide optimum speed limits to the ISA facilities of the vehicle, the correct transmission of the data also needs to be verifiably ensured. To address privacy issues it is also required that the ID which is needed for acknowledgement can not be linked to the vehicle or driver and has to be separately generated for each trip.

3. Allocation of User Needs

The COOPERS project has chosen to use the FRAME methodology for the development of its project ITS architecture. This means that the project itself has mapped the Services to the existing FRAME User Needs and identified any new User Needs that are needed.

The first table on the following pages shows the results of the work to map the Services to the existing FRAME User Needs, as provided by the COOPERS project. In the second table are shown the new FRAME User Needs that the COOPERS project has created because no sensible mapping could be found.

Some slight changes have been made to the layout of the tables and to the titles of some of the columns. Also the titles of each of the User Need Groups and some Services have been added where they were not included in the original tables.

Table 1 Allocation of existing and new FRAME User Needs to COOPERS Services

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																	
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13
1. General		<i>This Group contains the properties that either the Framework Architecture should possess, or that systems built in conformance to the Framework Architecture should possess.</i>																		
1.1 Architectural Properties	1.1.1	The Framework Architecture description shall include functional, information, physical and communication perspectives.	x																	
	1.1.3	The Framework Architecture description shall include a glossary to explain all the main concepts described in the architecture.	x																	
	1.1.4	The Framework Architecture shall be provided in a form which enables it to be up-dated after delivery.	x																	
	1.1.5	The Framework Architecture shall be technology independent.	x																	
	1.1.6	The Framework Architecture shall facilitate the creation of modular and flexible designs, so that manufacturers can produce their own versions of equipment.	x																	

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																	
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13
	1.1.7	The Framework Architecture shall allow equipment performing the same service to be provided by various suppliers.	x																	
	1.1.8	The Framework Architecture shall allow the same service to be provided by various service providers.	x																	
	1.1.10	The Framework Architecture shall support interaction between services provided by private and public bodies.	x																	
	1.1.11	The Framework Architecture shall allow current organisational responsibilities and legal liabilities to be retained.	x																	
	1.1.12	The Framework Architecture shall, where possible, describe migration path(s) that can be followed to enable architectures defined for existing traffic and transport management, as well as other ITS control and information systems, to become compliant.	x																	
	1.1.13	The Framework Architecture shall allow the use of existing and emerging communication infrastructures, or describe possible migration paths to explain how they can become compliant.	x																	

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																	
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13
	1.1.14	The Framework Architecture shall support the integration of Traffic Information Centres and Traffic Control Centres into national and international networks.	x																	
1.2 Data Exchange	1.2.1	The Framework Architecture shall provide a high level description of the message sets and data communication protocols to be used in data transfers.	x																	
	1.2.2	The Framework Architecture shall provide a high level description of data stores and data flows, and shall have a single data dictionary.	x																	
	1.2.3	Systems that conform to the Framework Architecture shall exchange information in a manner that permits a given geographic location to be understood by all parties.	x																	
	1.2.4	Systems that conform to the Framework Architecture shall exchange information in a manner that permits road and traffic conditions to be understood by all parties.	x																	
	1.2.5	The Framework Architecture shall provide a high level description of the message sets used to exchange data with external interfaces.	x																	

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																	
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13
	1.2.6	The Framework Architecture shall support the use of seamless communications. This shall mean that the use of different communication networks is transparent i.e. switches are made without the intervention of the final user.	x																	
1.3 Adaptability	1.3.2	Systems that conform to the Framework Architecture shall be able to provide facilities to enable data about the travel network to be entered and updated.	x																	
	1.3.5	The Framework Architecture shall not constrain user interfaces to be of a particular type, or from a particular manufacturer.	x																	
	1.3.6	The Framework Architecture shall not require that each of its user interfaces must operate on a specific item of equipment, unless it is for safety reasons.	x																	
1.4 Constraints	1.4.1	The Framework Architecture shall require all systems developed from it to comply with current European and National laws concerning data security, user anonymity and the protection of individual privacy.	x																	

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																			
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13		
	1.4.2	The Framework Architecture shall require all systems developed from it to comply with the traffic laws and regulations that apply in Europe.	x																			
	1.4.3	The Framework Architecture shall conform to relevant MoU, European directives and guidelines, and European (de facto-) standards.	x																			
1.5 Continuity	1.5.1	The Framework Architecture shall provide functionality such that the quality of information content is continuous and consistent, both in time and space (i.e. as the traveller moves).	x																			
	1.5.2	The Framework Architecture shall provide functionality that can accommodate environmental stress and infrastructure failures.	x																			
1.6 Cost/Benefit	1.6.1	Whenever possible and practical, the Framework Architecture shall use the same data as input to several parts of its functionality.	x																			
	1.6.2	The Framework Architecture shall avoid the need for unnecessary multiple data sources or redundant data management.	x																			

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																			
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13		
	1.6.3	The Framework Architecture shall require all systems developed from it to be able to use the most cost-effective means of communication available.	x																			
	1.6.4	The Framework Architecture shall require all systems developed from it to enable operating costs to be reduced whenever possible, when compared with the systems that they replace.	x																			
1.7 Expandability	1.7.1	The Framework Architecture shall allow systems developed from it to have an evolutionary development strategy that enables their continuous upgrading.	x																			
	1.7.2	The Framework Architecture shall provide services that are not constrained to operate in a particular geographic region.	x																			
1.8 Maintainability	1.8.1	The Framework Architecture shall require all systems developed from it to be capable of being repaired.	x																			
	1.8.2	The Framework Architecture shall require all systems developed from it to be easily maintainable with minimum disturbance.	x																			

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																	
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13
1.9 Quality of Data Content	1.9.1	The Framework Architecture shall enable all information systems developed from it to provide data with a stated accuracy, either as additional information or as part of the documentation, at all times.	x																	
	1.9.2	The Framework Architecture shall require all systems developed from it to check all input data for validity, whenever possible, and to report failures.	x																	
	1.9.3	The Framework Architecture shall enable all systems developed from it to check data values by comparing different sources, when available, so as to ensure high-accuracy and completeness.	x																	
	1.9.4	The Framework Architecture shall require all systems developed from it to manage local/regional/national databases in a consistent way.	x																	
1.10 Robustness	1.10.1	The Framework Architecture shall allow all systems developed from it to be able to detect errors in operation, when higher integrity is required, e.g. for financial, security or safety reasons.	x																	

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																	
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13
	1.10.2	Systems that conform to the Framework Architecture shall be able to monitor each safety-related component (including software), warn the user in case of problems, and disable it, or reduce it to a safe state.	x																	
	1.10.3	The Framework Architecture shall require all safety-related systems developed from it to be fault-tolerant.	x																	
	1.10.4	The Framework Architecture shall require all systems developed from it to be reliable with respect to the legal and/or quality requirements necessary for each application.	x																	
	1.10.5	The Framework Architecture shall require all systems developed from it to be able to operate in all potential climatic and traffic conditions.	x																	
1.11 Safety	1.11.1	The Framework Architecture shall provide functionality that operates in a manner that does not generate a safety hazard for its users.	x																	
	1.11.2	The Framework Architecture shall provide functionality that operates in a manner that does not encourage unsafe behaviour.	x																	

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																			
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13		
	1.11.4	The Framework Architecture shall provide functionality that is ultimately under the control of the human operator.	x																			
1.12 Security	1.12.1	The Framework Architecture shall require that systems developed from it are capable of surviving accidental and intentional attacks on their integrity.	x																			
	1.12.2	The Framework Architecture shall require systems developed from it to provide protection against unauthorised access.	x																			
1.13 User Friendliness	1.13.1	The Framework Architecture shall require all systems developed from it to have user interfaces with similar "look and feel" and similar end user assistance.	x																			
	1.13.2	The Framework Architecture shall require all systems developed from it to be simple and efficient for travellers to use, and easy to understand.	x																			
	1.13.3	The Framework Architecture shall require all interactive systems developed from it to have a user interface syntax that is easy to learn and to remember (especially for users with specific needs).	x																			

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																			
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13		
	1.13.4	Systems developed from the Framework Architecture shall produce their output within a time that is sufficient to be useful, and within normal expectations,	x																			
2 Infrastructure Planning and Maintenance		<i>This Group contains the activities associated with long term planning, modelling and reporting as well as the maintenance of the infrastructure. These User Needs have links with Groups 6-10.</i>																				
2.1 Transport Planning Support																						
2.1.0 Objectives	2.1.0.1	The system shall be able to exchange traffic and travel information between adjacent TICs to enhance local information and to improve strategic planning.	x																			
2.1.1 Information Management	2.1.1.2	The system shall be able to provide links to non-transport information systems using "open" communication protocols.	x	x	x		x	x														
2.1.2 Planning	2.1.2.2	The system shall be able to develop and implement traffic environmental management strategies based on current and predicted traffic conditions.	x							x	x	x	x		x						x	

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																		
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13	
	2.1.2.4	The system shall be able to simulate a demand management strategy on the road network.	x					x				x	x	x		x		x		x	
	2.1.2.5	The system shall be able to simulate potential capacity reduction, e.g. due to road works.	x	x	x		x	x									x				x
2.1.3 Evaluation	2.1.3.1	The system shall be able to measure the effect of a strategy, and to modify it when necessary.	x							x	x	x	x			x		x			
2.1.4 Reporting	2.1.4.1	The system shall collect and report data as required by legally appointed authorities.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
2.2 Infrastructure Maintenance Management																					
2.2.0 Basic Services	2.2.0.1	The system shall provide support for road maintenance and infrastructure management.	x					x	x	x	x	x			x			x			
	2.2.0.2	The system shall be able to recommend short term road maintenance activities, including winter maintenance, based on data collected from the road infrastructure possibly combined with the current and/or forecast weather conditions.																			

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																				
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13			
	2.2.0.4	The system shall be able to support a database of maintenance operations.																					
	2.2.0.5	The system shall be able to transmit current and future maintenance schedules to TCCs.	x					x	x											x			
	2.2.0.6	The system shall be able to maintain statistics on road usage to evaluate the need for possible maintenance.																					
2.2.2 Monitoring	2.2.2.1	The system shall be able to receive infrastructure equipment status data remotely.	x							x		x	x										
	2.2.2.3	The system shall be able to support a database of the road network, infrastructure and road-side equipment.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
3 Law Enforcement		<i>This Group contains the activities associated with the enforcement of traffic laws and regulations, and the collection of evidence. These User Needs have links with Groups 6-10.</i>																					
3.1 Policing / Enforcing Traffic Regulations																							

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																			
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13		
3.1.0 Objectives	3.1.0.2	The system shall be able to collect the evidence of a violation of the traffic laws and regulations in a manner suitable to justify the application of a legal punishment	x			x			x			x										
4 Financial Transactions		<i>This Group contains the activities associated with the payment for traffic or travel services, and includes the manner of the transaction, its enforcement, and the sharing of revenues. These User Needs have links with Groups 6-10.</i>																				
4.1 Electronic Financial Transactions																						
4.1.0 Objectives	4.1.0.4	The system shall be able to manage tariff policies (define fares/fees according to selected criteria).	x															x				
4.1.1 Traffic Management	4.1.1.1	The system shall have a minimum impact on the traffic flow, e.g. a short transaction duration.	x															x				
	4.1.1.2	The system shall have a minimum impact on the driving task.	x															x				

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12
	6.1.0.4	The system shall be able to provide information on alternative routes, e.g. where they are quicker, cheaper, shorter, scenic, etc.	x												x	x	x	x	
6.1.2 Information Handling	6.1.2.1	The system shall inform the User when changes occur to the criteria upon which the pre trip information had been given.	x												x	x	x	x	
	6.1.2.3	The system shall be able to provide route information to all drivers, e.g. restrictions, travel times, etc.	x												x	x	x		
	6.1.2.5	The system shall be able to analyse, process and retrieve data from different combinations of sources (including floating car).	x	x	x	x	x	x	x	x		x	x	x	x	x	x		x
	6.1.2.6	The system shall be able to provide road and traffic information adapted to different classes of users, e.g. travellers, radio broadcasters, service operators.	x	x	x	x	x	x	x		x	x	x		x	x	x	x	x
	6.1.2.7	The system shall provide information using graphical representation or text. Graphical form shall include the use of maps as well as text.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																	
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13
	6.1.2.8	The system shall provide information in the native language at the output location, and/or from a user selected choice of other appropriate foreign languages.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	6.1.2.9	The system shall provide Information Management tools for the operator.	x							x	x	x	x						x	
6.1.3 Traveller Interaction	6.1.3.9	The system shall communicate with other information systems using "open" standard protocols.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	6.1.3.10	The system shall provide information for fixed and mobile terminals using "open" standard communication protocols.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
6.2 On-trip Information																				
6.2.0 Objectives	6.2.0.1	The system shall provide emergency, or urgent, information to all users free of charge.	x	x	x	x	x	x	x	x	x	x	x		x	x				
	6.2.0.2	The system shall be able to require payment for non-emergency, or non-urgent, information.	x											x			x	x	x	

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																		
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13	
	6.2.0.3	The system shall be able to be activated automatically by another system, e.g. traffic management.	x	x	x	x	x		x	x	x	x	x		x	x		x			
	6.2.0.4	The system shall provide traffic information (e.g. travel conditions on roads and other modes, accidents, special events, car park status, etc.) to the traveller during his/her trip in a timely manner. .	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	6.2.0.6	The system shall inform the User when changes occur to the criteria upon which the trip information had been given.	x												x	x	x	x			
6.2.2 Information Handling	6.2.2.1	The system shall be able to inform travellers on the current average travel time between fixed points.	x												x		x				
	6.2.2.4	The system shall provide road and traffic safety advice based on current weather and traffic conditions.	x	x	x	x	x	x	x	x	x	x	x	x				x			
	6.2.2.5	The system shall be able to provide all drivers with information on current road travel conditions, e.g. route restrictions, travel times, etc.	x	x	x	x	x	x	x	x	x	x			x	x	x				

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																	
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13
	6.2.2.8	The system shall be able to provide road information according to different geographic scales, e.g. local, regional, national, international.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	6.2.2.9	The system shall be able to adapt the information to different classes of users, e.g. travellers, radio broadcasters, service operators.	x	x	x	x	x	x	x		x	x	x		x	x	x	x		x
	6.2.2.10	The system shall be able to collect data from a variety of different sources, e.g. road/traffic management, police, weather services, floating car etc.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	6.2.2.11	The system shall be able to provide operators with an overall view of all active events in an area.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	6.2.2.12	The system shall provide Information Management tools for the operator.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
6.2.3 Traveller Interaction	6.2.3.1	The system within the vehicle, or in the centre, shall support various types of presentation to the user, e.g. text, graphics, symbols, speech, etc.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12
	6.2.3.2	The system shall normally provide messages from a finite set of well defined message texts.	x	x	x	x	x	x	x	x	x	x	x		x	x	x		
	6.2.3.3	The system shall provide information in the native language at the output location, and/or from a user selected choice of other appropriate foreign languages, when applicable.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	6.2.3.4	The system shall provide information using "open" standard communication protocols.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	6.2.3.5	The system shall be able to provide customised on-trip information to hand-held and in-vehicle devices.																	
	6.2.3.8	The system shall be able to provide road and traffic information using road-side equipment, e.g. VMS.	x	x	x	x	x	x	x		x	x	x				x	x	
6.4 Route Guidance and Navigation																			
6.4.0 Objectives	6.4.0.3	The system shall know where it is within the road network.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																	
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13
6.4.1 Information Handling	6.4.1.3	The system shall be able to compute the total predicted journey time over the route selected.	x														x	x		
	6.4.1.6	The system shall provide information which is consistent with any other information being presented about the road.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
6.4.2 Traveller Interaction	6.4.2.1	The system shall provide route guidance using visual and voice instructions.	x							x	x	x	x					x		
	6.4.2.2	The system shall contain menus which are structured in a logical manner and oriented towards the requirements of the driver (e.g. the most frequently used function shall be the easiest to select).	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	6.4.2.4	The system shall enable the use of portable equipment to provide route guidance.	x														x		x	
7 Traffic, Incidents and Demand Management		<i>The Group covers activities associated with traffic control, incident management and demand management, including monitoring, planning, flow control, exceptions management, speed management, lane and parking management, HOV, road pricing and zoning, and VRUs.</i>																		

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12
7.1 Traffic Control																			
7.1.0 Objectives	7.1.0.1	The system shall support the existing and new traffic management needs of authorities by providing a flexible yet comprehensive approach to determine traffic management strategies (including bridge and tunnel control).	x							x	x	x	x		x				x
	7.1.0.2	The system shall be able to implement identified control strategies that conform with specified policy.	x							x			x						
	7.1.0.3	The system shall not do anything to reduce road safety.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	7.1.0.4	The system shall manage road traffic in such a way that levels of environmental (i.e. atmospheric and noise) pollution may be reduced.	x										x		x		x		x
	7.1.0.5	The system shall manage road traffic in such a way that congestion (travel time) may be reduced.	x							x	x	x	x		x		x	x	x
	7.1.0.6	The system shall be able to help co-ordinate the activities of TICs and TCCs.	x												x				

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																		
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13	
	7.1.0.7	The system shall be able to exchange information between TICs and TCCs, including across national boundaries.	x											x							
	7.1.0.8	The system shall enable the data that it stores to be extracted by an operator onto a variety of media and used for other purposes, or by other organisations.	x	x	x	x	x	x							x		x	x			x
	7.1.0.9	The system shall ensure that traveller information service providers are aware of the traffic management strategy, so that they can provide information that conforms to it.	x	x	x	x	x	x	x	x	x	x	x			x	x	x			x
	7.1.0.11	The system shall be able to control inter-urban roads and traffic.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	7.1.0.12	The system shall be able to use different traffic management techniques to control separate areas of the road network.	x							x	x	x	x		x		x		x		
7.1.1 Monitoring	7.1.1.1	The system shall be able to monitor sections of the road network to provide the current traffic conditions (e.g. flows, occupancies, speed and travel times etc.) as real time data.	x	x	x	x	x	x	x	x	x	x	x			x	x	x			x
	7.1.1.3	The system shall monitor inter-urban roads and traffic.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Co-operative Systems Combined Requirements

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																		
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13	
	7.1.1.4	The system shall be able to monitor traffic flow at, and the operation of, the road intersections of the network over which it has the control.	x	x	x		x	x	x	x	x	x	x		x	x	x			x	
	7.1.1.5	The system shall be able to monitor the entire road network (network state surveillance tool).	x	x	x	x	x	x	x	x	x	x	x		x	x	x			x	
	7.1.1.6	The system shall be able to monitor and record weather conditions, e.g. wind, fog, rain level, ice, etc.	x				x					x		x						x	x
	7.1.1.8	The system shall be able to measure the range of visibility and detect reductions caused by adverse weather and pollution conditions (but not darkness).	x				x					x		x						x	x
7.1.2 Planning	7.1.2.1	The system shall be able to use consistent historical data to complement real-time data, when necessary.	x											x						x	x
	7.1.2.2	The system shall be able to predict short, medium, and long-term traffic conditions, e.g. for minutes, hours and days ahead.	x																	x	x
	7.1.2.3	The system shall be able to use historical data to complement predicted data, when necessary.	x											x						x	x

Co-operative Systems Combined Requirements

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																	
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13
	7.1.2.4	The system shall be able to analyse road and traffic data to predict possible critical situations.	x				x										x	x		
	7.1.2.5	The system shall be able to predict weather conditions, in particular the formation of fog and/or ice.	x				x													
	7.1.2.6	The system shall be able to predict short, medium and long-term (e.g. for minutes, hours and days ahead) road travel produced environmental (atmospheric and noise) pollution conditions based on traffic and weather conditions.	x									x					x		x	
	7.1.2.7	The system shall be able to provide historical and predicted data.	x				x				x	x	x				x	x	x	
7.1.3 Traffic Control Centres	7.1.3.1	The system shall enable a TCC operator to control, possibly remotely, infrastructure elements (e.g. traffic lights, VMS).	x	x	x	x	x	x	x	x			x						x	
	7.1.3.3	The system shall be able to provide a graphical representation of the road network which includes relevant features (e.g. equipment, events, traffic condition etc.) to TCC operators.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																		
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13	
	7.1.3.4	The system shall be able to activate control devices (e.g. traffic lights, VMS), either individually or in groups.	x	x	x	x	x	x	x		x	x	x						x		
	7.1.3.5	The system shall enable TCC operators to make temporary changes to the normal control strategy in real-time.	x							x	x	x	x		x		x		x		
	7.1.3.6	The system shall be able to implement planned control strategies for planned events, e.g. sport, cultural, etc.	x							x	x	x	x				x		x		
7.1.4 Traffic Flow Control	7.1.4.3	The system shall provide Tidal Flow Control (reservation of lanes for exclusive use in one direction for a period, then the other direction for another period, on parts of the road network).	x							x		x									
	7.1.4.8	The system shall be able to provide co-ordinated traffic management operations during periods of mass movement across (many) regions.	x							x	x	x	x			x	x		x		
7.1.5 Exceptions Management	7.1.5.2	The system shall be able to command drivers to change lanes on multi-lane roads.	x							x		x									

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																				
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13			
	7.1.5.3	The system shall be able to change the direction of traffic flow on a carriageway in an orderly manner so that it does not create a safety hazard to any road user.	x							x		x											
	7.1.5.5	The system shall be able to close roads and advise drivers of a suitable diversionary route for a period of time.	x							x										x			
	7.1.5.6	The system shall be able to command certain classes of vehicle (e.g. heavy vehicles or tourist traffic) to take an alternative route for a period of time.	x																	x			
	7.1.5.7	The system shall be able to recommend re-routing strategies to reduce congestion or atmospheric pollution.	x																	x			
	7.1.5.8	The system shall request confirmation of all exceptional measures before they are executed.	x							x	x	x	x							x			
7.1.7 Speed Management	7.1.7.1	The system shall be able to show the maximum authorised speed of vehicles on selected carriageways to be shown to drivers, and to detect violators.	x											x									x
	7.1.7.2	The system shall be able to set variable speed limits on parts of the road network.	x											x									

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																	
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13
	7.1.7.3	The system shall be able to calculate recommended speed limits for given traffic and weather conditions, and road network characteristics.	x										x							
	7.1.7.4	The system shall be able to transmit recommended speed limits to equipped vehicles.	x									x	x							
	7.1.7.5	The system shall be able to support a database of all speed limits on the road network.	x									x	x							
	7.1.7.6	The system shall be able to provide vehicles with information about the road network, e.g. speed limits, road hazards, junctions etc.	x									x	x						x	
7.1.8 Roadside-Vehicle Communications	7.1.8.1	The system shall be able to transmit information to a vehicle to update its on-board database.	x																	x
7.1.8 Roadside-Vehicle Communications	7.1.9.2	The system shall be able to minimise delays of all vehicles using adaptive signal control	x							x	x	x	x					x	x	

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																			
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13		
	7.2.0.9	The system shall be able to run (pre-)defined incident mitigation strategies automatically.	x	x	x	x	x	x	x	x		x	x									
7.2.2 Information Management	7.2.2.1	The system shall be able to collect and store data on each incident, e.g. location, type, severity, number & type of vehicles involved, the emergency/rescue vehicles needed etc.	x	x	x	x																
	7.2.2.2	The system shall be able to identify and classify all incidents on the road network.	x	x	x	x	x	x					x									x
	7.2.2.3	The system shall be able to provide information on each incident to TICs for onward transmission to travellers.	x	x	x	x	x	x														x
7.2.3 Reporting	7.2.3.1	The system shall be able to produce incident data statistics, e.g. frequencies of occurrence, by time, type and location; identification of "high risk" locations on the road network; performance of the incident detection system.	x	x	x	x							x									
7.2.4 Post-Incident Management	7.2.4.1	The system shall be able to minimise the consequences of an incident on the road network for those travellers who are not involved.	x	x	x	x	x	x	x	x	x	x	x	x						x		x

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																					
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13				
	7.2.4.2	The system shall be able to monitor the aftermath of an incident.	x	x	x	x									x								x	
7.2.5 Pre-Incident Management	7.2.5.1	The system shall be able to detect "non-vehicle" incidents before they can escalate into traffic accidents, e.g. bad weather conditions, objects on the road, ghost drivers, etc.	x		x	x	x								x								x	
	7.2.5.2	The system shall be able to provide local warnings on dangerous sections of the road network.	x	x	x	x	x	x							x									x
7.3 Demand Management																								
7.3.0 Objectives	7.3.0.1	The system shall provide information that will influence travellers' decisions regarding aspects of their journey, e.g. destinations, time, mode of travel, route etc.	x	x	x	x	x	x							x		x	x	x	x				
	7.3.0.2	The system shall receive up-to-date information on those factors that will influence the demand management strategy, e.g. traffic levels, car park usage, other modes usage, fares, tolls, etc.	x															x	x					
	7.3.0.3	The system shall be able to recommend a strategy to reduce demand.	x															x		x				

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12
	7.3.0.4	The system shall be able to simulate a demand management strategy on the road network.	x												x		x		
	7.3.0.5	The system shall be able to simulate potential capacity reduction, e.g. due to road works.	x													x	x		
7.3.1 Zoning	7.3.1.2	The system shall be able to recommend alternative routes (e.g. that take into account the needs of heavy vehicles (and hazardous goods)) when required.	x														x		
7.3.2 Pricing Management	7.3.2.1	The system shall be able charge for the use of a section of road, or facility (e.g. bridge, tunnel etc.), based on given policy decisions, e.g. duration, distance, congestion etc.	x												x				
	7.3.2.2	The system shall be able to adjust toll fees according to a given pricing strategy.	x												x				
8 Intelligent Vehicle Systems		<i>This Group contains the functions found within a vehicle, including vision enhancement, longitudinal and lateral collision avoidance, lane keeping, platooning, speed control, driver alertness, 'May Day' initiation, etc.</i>																	
8.2 Automated Vehicle Operation																			

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																					
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13				
8.2.5 Speed Control	8.2.5.1	The system shall be able to provide support to limit the speed of a vehicle automatically to the a given, but variable, maximum (intelligent speed adaptation)	x																					
	8.2.5.2	The system shall be able to receive (variable) mandatory speed limits from outside the vehicle.	x										x		x									
	8.2.5.4	The system shall be able to display continuously to the driver the current mandatory speed limit.	x										x											
8.4.2 Lane Keeping	8.4.2.1	The system shall be able to provide support to detect the position of the vehicle relative to lane boundaries and/or roadway shoulders.	x																					x
8.5 Safety Readiness																								
8.5.0 Basic Services	8.5.0.1	The system shall minimise the risk of an accident due to the impaired alertness of the driver.	x	x	x	x	x	x							x									
8.5.4 Accident Data Recording	8.5.4.1	The system shall be able to record data about an accident and the journey immediately before (black box).																						

Related sets of User Needs within Fundamental Services within FRAME Groups	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																				
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13			
8.5.5 Traffic Information & Signs	8.5.5.1	The system shall provide "copies" of the traffic signs that are relevant to the current section of the road (e.g. speed limit, road hazards, junctions) to the driver at all times.	x	x	x	x	x	x	x				x	x									
	8.5.5.2	The system shall be able to send to following vehicles "copies" of the traffic signs, or information about the local traffic (e.g. sudden congestion), that it may be useful to receive in advance	x	x	x	x	x	x	x				x	x									

Table 2 Allocation of new FRAME User Needs to COOPERS Services

Existing FRAME User Needs Group	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																				
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13			
3 Law Enforcement		<i>This Group contains the activities associated with the enforcement of traffic laws and regulations, and the collection of evidence. These User Needs have links with Groups 6-10.</i>																					
	3.21.1.1CO	The system shall be able to verify that all lane banning instructions have been delivered correctly.	x							x													
	3.21.1.2CO	The system shall be able to verify that all recommended speeds have been delivered correctly.	x												x								
	3.21.1.3CO	The system shall be able to verify that all legal speed limits have been delivered correctly.	x											x									
4 Financial Transactions		<i>This Group contains the activities associated with the payment for traffic or travel services, and includes the manner of the transaction, its enforcement, and the sharing of revenues. These User Needs have links with Groups 6-10.</i>																					

Existing FRAME User Needs Group	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																	
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13
	4.21.1.1CO	The system shall provide in-vehicle information about current & predicted dynamic tolls	x													x				
	4.21.1.2CO	The system shall provide dynamic tolling information to fleet dispatchers via an open interface	x													x				
6 Travel Information and Guidance		<i>This Group contains all the activities concerned with the handling of pre-trip and on-trip information, including mode choice and change, and route guidance</i>																		
	6.2.2.21CO	The system shall display messages according to their situational priority.	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	
	6.2.3.21CO	The system shall display traffic signs according to the Vienna convention.	x	x	x	x	x	x	x			x	x							
	6.2.3.22CO	The system shall provide information well designed in terms of format and amount to avoid overload and distraction of the user.	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	
	6.4.1.21CO	The system shall provide dynamic information on estimated journey time deviations on motorway segments to enable dynamic navigation.	x														x			

Existing FRAME User Needs Group	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																	
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13
	6.4.1.22CO	The system shall provide current and predicted journey times on motorways to navigation devices via an open interface to enable dynamic navigation.	x														x			
	6.4.1.23CO	The system shall provide up-to-date static information for digital maps in a standardised representation format.	x																x	
7 Traffic, Incidents and Demand Management		<i>The Group covers activities associated with traffic control, incident management and demand management, including monitoring, planning, flow control, exceptions management, speed management, lane and parking management, HOV, road pricing and zoning, and VRUs.</i>																		
	7.1.0.21CO	The system shall exchange network information based on standard protocols between neighbouring control centres (international or regional) to ensure continuity of services for travellers.	x												x					
	7.1.0.22CO	The system shall classify events, their severity and reference their locations in a standardised way.	x	x	x	x	x	x						x						
	7.1.0.23CO	The system shall ensure consistent information on all channels to the driver.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Existing FRAME User Needs Group	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																				
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13			
	7.1.1.21CO	The system shall be able to locate the tail end of congestions and estimate its propagation speed.	x										x									x	
	7.1.1.22CO	The system shall use real-time extended floating car data (e.g. vehicle speed, fog lamps, wiper activity, location) to enhance its traffic status database for improved event detection (e.g. temporal and spatial end of congestion) and coverage.	x																				x
	7.1.1.23CO	The system shall verify extended floating car data (e.g. by statistical means or plausibility checks) to prevent wrong conclusions.	x																				x
	7.1.5.21CO	The system shall be able to manage different severity types of diversity route advice including informative, recommended and binding instructions.	x																		x		
	7.1.7.21CO	The system shall provide drivers with dynamic, in-vehicle information on legal speed for current segment depending on the vehicle type.	x										x										
	7.1.7.22CO	The system shall provide legal speed limits via standardised protocols.	x										x										

Co-operative Systems Combined Requirements

Existing FRAME User Needs Group	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																			
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13		
	7.1.7.23CO	The system shall warn drivers of weather conditions in case there is a link to a different legal speed limit.	x				x							x								
	7.1.10.21CO	The system shall provide dynamic, in-vehicle lane banning instructions for specific vehicle types or user groups.	x								x											
	7.1.10.22CO	The system shall provide lane restrictions via standardised protocols.	x								x	x	x									
	7.1.10.23CO	The system shall provide dynamic, in-vehicle advice for drivers or specific user groups not to overtake to stabilize traffic flow.	x									x										
	7.1.10.24CO	The system shall provide in-vehicle information about auxiliary lane availability according to vehicle type.	x											x								
	7.1.10.25CO	The system shall ensure that the auxiliary lane is not occupied before it is released.	x											x								
	7.1.10.26CO	The system shall provide auxiliary lane availability status via standardised protocols.	x											x								

Existing FRAME User Needs Group	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																				
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13			
8 Intelligent Vehicle Systems		<i>This Group contains the functions found within a vehicle, including vision enhancement, longitudinal and lateral collision avoidance, lane keeping, platooning, speed control, driver alertness, 'May Day' initiation, etc.</i>																					
	8.2.5.21CO	The system shall provide support to automatically match the speed control to the prevailing traffic, weather and road conditions based on the recommended speed.	x																				
	8.2.5.22CO	The system shall display legal speed limits at all times. Display out-of-order message if the service provision can't be guaranteed.	x											x									
	8.2.5.23CO	The system shall provide recommended speed limits unambiguously and continuously to the driver according to vehicle type and lane. Display out-of-order message if the service provision can't be guaranteed.	x																				
	8.5.5.21CO	The system shall warn drivers timely of incidents ahead via adapted and dynamic in-vehicle information.	x	x	x	x	x	x															

Co-operative Systems Combined Requirements

Existing FRAME User Needs Group	User Need Reference Number (ID)	User Need Description	COOPERS Services to which the User Needs apply																	
			All	S1a	S1b	S1c	S2	S3	S4a	S4b	S4c	S5	S6	S7	S8	S9	S10	S11	S12	S13
	8.5.5.22CO	The system shall be able to warn drivers timely of moving incidents (e.g. roadwork trailers, winter maintenance, heavy load vehicles) via adapted and dynamic in-vehicle information.	x			x		x												
	8.5.5.23CO	The system shall provide in-vehicle, dynamic information to warn drivers of hazardous conditions ahead caused by weather conditions	x				x													
	8.5.5.24CO	The system shall display lane restrictions as long as they apply. Display out-of-order message if the service provision can't be guaranteed.	x							x	x	x								
	8.5.5.25CO	The system shall provide dynamic, in-vehicle information on accessible lanes in case of lane restrictions.	x							x	x	x								
	8.5.6.21CO	The system shall provide means to ensure cost-efficient use of transmission media and prevent flooding of the communication infrastructure.	x																	x
	8.5.6.22CO	The system shall interface the in-vehicle bus in a way that does not reduce road safety.	x																	x

4. Further Definitions

The following are more detailed definitions than those that are provided in the table of "Abbreviations".

XCFD: According to part of the the BMW web-site, which can be found at:

([http://www.automotoportal.com/article/BMW_XFCD -
Extended Floating Car Data System Video](http://www.automotoportal.com/article/BMW_XFCD_-_Extended_Floating_Car_Data_System_Video))

XFCD is data that comprises information about weather and road conditions. According to the CVIS project web-site at: (<http://www.cvisproject.org/en/links/xfcd.htm>), XFCD comprises traffic states and safety relevant events and situations. It goes on to say that the BMW cars process various information, such as speed, brake activity, headlight and wiper status, and also data from the navigation system and the stability control system. The program can use this data to draw conclusions about the traffic and weather situation and warn subsequent vehicles about traffic jams or icy conditions, for example.