List of standards applicable for specifications and development

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1.00	16/10/15	H. Aniss		Release 1
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Reference to the version administration

Version number to be composed of 3 digits > vR.XY
- **R** corresponds to the release number : it is upgraded each time SC Studies validates the diffusion of a new release,
- **X** is the major version number: it is upgraded each time SC Studies validates the deliverable,
- **Y** is the minor version number: it is upgraded each time a contributor changes anything.
Once the deliverable is approved, its version number is upgraded from vR.XY to vR.(X+1)0
Once the deliverable is release, its version number is upgraded from vR.XY to v(R+1).00

As illustration :
   0.03 > Work in progress version
   0.10 > Del. Approved by SC Studies but not released
   2.00 > Del. approved & released (in release 2)
   2.05 > Del. Updated - in progress version

Table of Contents

Glossary

- CAM   Cooperative Awareness Message
- C2C-CC   Car to Car Communication Consortium
- CEN   Centre européen de normalisation (*European* Committee for Standardization)
- DENM Decentralized Environmental Notification Message
- DSRC Dedicated Short Range Communications
- ISO   International Standardization Organization
- ITS   Intelligent Transport Systems
- ITS-AID   ITS-Application Identifier
- ITSS-C ITS Station- Central
- ITS-G5A   ITS Frequency band 5.875 GHz to 5.905 GHz dedicated to safety related applications
- ITS-S   ITS station
- ITSS-R ITS station - Roadside
- ITSS-V ITS station - Vehicle
- I2I   Infrastructure-to-Infrastructure Communications
- RHW   Road Hazard Warning
- TMS   Traffic Management System

1.   Introduction

The goal of SCOOP is to test the deployment of cooperative services under real conditions.

The work to develop specifications for the SCOOP project depends on either:

- choosing the norms or standards,
- choosing how to use these norms or standards, or
- producing specifications specific to the SCOOP project for the objects not covered by the norms or standards.

The objective of this deliverable is to list the chosen norms and standards that must necessarily be specified in project specifications to be sent to the suppliers that will do the developments.
Consequently, the suppliers must be able to access the chosen norms and standards. These norms and standards are specified in their dated version. Consequently, the body of norms and standards cited in this deliverable is frozen at the publication date of the deliverable's version. The versions cited are not scheduled to be updated during the SCOOP Part 1 project. To the extent that new versions would be published after the publication date of this deliverable, they would not be updated in this deliverable and therefore would not be taken into account for the SCOOP Part 1 development, apart from exceptions.

The norms and standards are chosen after discussions based on the expertise of SCOOP members.
The following elements can be distinguished in particular:

- Supporting documentation is provided for some choices of norms, including the grounds for the choices made in versions prior to to the last published version and available at the date this deliverable was established, when applicable.
- The known implications in terms of compatibility or incompatibility with the other European projects are listed.

This document contains the following items:

- The scope studied in chapter 3
- The use cases considered in chapter 4
- The versions of the norms and standards chosen for the ITS-G5 stack in chapter 5
- The versions of the norms and standards chosen to treat the security aspects, chapter 6
- The versions of the norms and standards chosen for the I2I communications in chapter 7
- The versions of the norms and standards chosen for the tests in chapter 8
- The aspects concerning the VMS use cases and in-vehicle signage in chapter 9
- The grounds for choosing certain versions of norms in chapter 10
- A comparative table of norms chosen for SCOOP with those chosen by other projects, chapter 11
- A few gaps in terms of norms and standards, especially the D8 cases of unmanaged obstructions and approaching operator vehicles, chapter 12

2. Scope

This chapter provides a concise list of SCOOP elements. For a more detailed understanding of the SCOOP system, refer to deliverable L2.4.1 (spécifications Socle commun des spécifications techniques et fonctionnelles pour SCOOP / *Common set of functional and technical specifications for SCOOP partners)*

The SCOOP system includes the following 5 types of elements:

1) **. ITS stations – roadside**
ITSS-R = station ITS roadside also called Roadside Unit (RSU)

2) **Two types of stations on-board vehicles:**

   a) ITSS-V = station ITS vehicle also called On-Board Unit (OBU) or ITSS-VU = ITSS-V User (OBU u = OBU user); the ITSS-Vs include the ITSS-VU Renault and ITSS-VU PSA.

   b) ITSS-VG = station ITSS-V operator
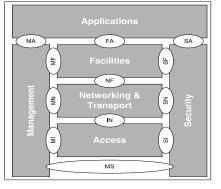   also, called OBU operator or OBU o. They are used according to 2 modes:
      1. "User Mode"
      2. operator" mode, which allows road operator specific functions, especially the ITSS-R mobile station or "OBU mobile" station

3) **The central station or SCOOP platform**
   - ITSS-C = station ITS central

4) **Traffic Management System (TMS) or traffic management centre (TMC)**

5) **The Public Key Infrastructure (PKI)**

NOTE:
The ITSS-V and ITSS-R are "ITS stations" whose general architecture is defined by ETSI (*European Telecommunications Standards Institute*). They include different layers illustrated in the following illustration and detailed from the point of view of norms.

General architecture of ITS stations

3. Use cases considered

The use cases are based on the nomenclature established in the deliverable L2.4.1.

Use case	Surname
A1	Traffic data (position, speed, direction)
A2	Data on detected events (crashes, etc.)
A3	Data on declared events
B1	Warning - scheduled site (land line and cell)
B2	Warning - road operator intervention
B3	Warning - winter maintenance
C2	Real-time speed signage
C3	Embedded VMS
D1	Warning – temporary slippery road
D2	Warning - animal, people on the road
D3	Warning - obstacle on the road
D4	Warning - stationary vehicles, breakdown
D5	Warning - unprotected accident area
D6	Warning – reduced visibility
D7	Warning - wrong way drivers
D8	Warning - unmanaged blockage of a road
E6	Warning - exceptional weather conditions
D10	Warning - emergency brake
D11	Warning - end of queue

4. Versions of the norms and standards chosen for the ITS-G5 stack

This table lists the references and versions of the norms and standards chosen, which have been published and are available.

Table: List of norms and standards for the ITS stations

No.	Norm	Reference	Version	Use cases	Organisations
	ACCESS LAYER				
1	Intelligent Transport Systems (ITS); Radiocommunications equipment operating in the 5,855 MHz to 5,925 MHz frequency band;	**EN 302 571**	**1.1.1 (2008-09)**	**All**	**ETSI**
2	Intelligent Transport Systems (ITS); Access layer specification for Intelligent Transport Systems operating in the 5 GHz frequency band	**EN 302 663**	**1.2.1 (2013-07)**	**All**	**ETSI / AFNOR**
3	Intelligent Transport Systems (ITS); Harmonized Channel Specifications for Intelligent Transport Systems operating in the 5 GHz frequency band	**TS 102 724**	**1.1.1 (2012-10)**	**All**	**ETSI**
4	Intelligent Transport Systems (ITS); Mitigation techniques to avoid interference between European ESC Dedicated Short Range Communication (ESC DSRC) equipment and Intelligent Transport Systems (ITS) operating in the 5 GHz frequency range	**TS 102 792**	**1.1.1 (2012-10)**	**All**	**ETSI**
	TRANSPORT LAYER				
5	Intelligent Transport Systems (ITS); Vehicular Communications; GeoNetworking; Part 4: Geographical addressing and forwarding for point-to-point and point-to-multipoint communications; Sub-part 1: Media-Independent Functionality	**EN 302 636-4-1**	**1.2.1 2014-07**	**All**	**ETSI**
6	Intelligent Transport Systems (ITS); Vehicular Communications; GeoNetworking; Part 5: Transport Protocols; Sub-part 1: Basic Transport Protocol	**EN 302 636-5-1**	**1.2.1 2014-08**	**All**	**ETSI / AFNOR**
	FACILITIES LAYER				
7	Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Part 2: Specification of Cooperative Basic Awareness Service	**EN 302 637-2**	**1.3.2 2014-11**	**All**	**ETSI**
8	Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Part 3: Specifications of Basic Decentralized Environmental Notification Service	**EN 302 637-3**	**1.2.2 2014-11**	**A, B, D, E**	**ETSI**
9	Intelligent Transport Systems (ITS);	**EN 302 931**	**1.1.1 2011-07**	**All**	**ETSI / AFNOR**

	Vehicular Communications; Geographical Area Definition				
10	Intelligent Transport Systems (ITS); Users and application requirements; Part 1: Facility layer structure, functional requirements and specifications	**TS 102 894-1**	**1.1.1** 2013-08	**All**	**ETSI**
11	Intelligent Transport Systems (ITS); Users and applications requirements; Part 2: Applications and facilities layer common data dictionary	**TS 102 894-2**	**1.2.1** 2014-09	**All**	**ETSI**
APPLICATIONS					
12	Intelligent Transport Systems (ITS); Application Object Identifier (ITS-AID); Registration list	**TR 102 965**	**1.1.1** 2013-03	**All**	**ETSI**
13	Intelligent Transport Systems (ITS); V2X Applications; Part 1: Road Hazard Signalling (RHS) application requirements specification	**TS 101 539-1**	**1.1.1** 2013-08	**A, B, D, E**	**ETSI**
14	Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Definitions	**TS 102 638**	**1.1.1** 2009-06	**All**	**ETSI**

5. Versions of the norms and standards chosen for security

SECURITY						
15	Intelligent Transport Systems (ITS); Security; ITS communications security architecture and security management	**TS 102 940**	**1.1.1** (2015-06)	**all**	**ETSI**	
16	Intelligent Transport Systems (ITS); Security; ITS; Trust and Privacy Management	**TS 102 941**	**1.1.1** (2012-06)	**all**	**ETSI**	
17	Intelligent Transport Systems (ITS); Security; ITS; Security services and architecture	**TS 102 731**	**1.1.1** (2010-09)	**all**	**ETSI**	
18	Intelligent Transport Systems (ITS); Security; Threat, Vulnerability and Risk Analysis (TVRA)	**TR 102 893**	**1.1.1** (2010-03)	**all**	**ETSI**	
19	Intelligent Transport Systems (ITS); Security; Security header and privacy management	**TR 103 097**	**1.2.1** **2015-06**	**all**	**ETSI**	
20	Intelligent Transport Systems (ITS); Security, Application Object Identifier	**TS 102 965**	**1.2.1** (2015-06)	**all**	**ETSI**	
21	Intelligent Transport Systems (ITS); Security; ITS-AID Assigned Numbers"	**ISO/TS17 419**	**1.1.1** (2010-03)	**all**	**ISO**	
22	Intelligent Transport Systems (ITS); Security; Trust and Privacy management	**TS 102 941**	**1.1.1** (2010-03)	**all**	**ETSI**	
23	Intelligent Transport Systems (ITS); OSI cross-layer topics; Part 8: Interface between security entity and network and transport layer	**TS 102 723-8**	**V1.1.1** (2016-04)	**all**	**ETSI**	

6.   Versions of the norms and standards chosen for I2I communications

DATEX					
24	Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 1: Context and Framework	**ESC/TS 16 157-1**	2011-10	**all**	**ESC**
25	Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 2: Location referencing	**ESC/TS 16 157-2**	2011-10	**all**	**ESC**
26	Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 3: Situation publication	**ESC/TS 16 157-3**	(2011-10)	**all**	**ESC**
27	Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 4: Variable Message Sign (VMS) Publications;	**ESC/TS 16 157-4**	(2014-04)	**C**	**ESC**
28	Intelligent transport systems - DATEX II data exchange specifications for traffic management and information – Part: 5 Measured and elaborated data publications	**ESC/TS 16 157-5**	**(2014-04)**	**A**	**ESC**
No. 29	Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 6: Parking Publications.	**ESC/TS 16 157-6**	**(2015-10)[1]**	**F**	**ESC**

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[1] Adopted by vote at end of June 2015 - In process of being published

7. Versions of the norms and standards chosen for the tests

TESTS					
30	Intelligent Transport System (ITS); Testing; Framework for conformance and interoperability testing.	ETSI EG 202 798	V1.1.1		
31	Intelligent Transport System (ITS) ; Testing ; Conformance test specification for TS 102 867 and TS 102 941 ; Part 1 : Test requirements and proforma Protocol Implementation Conformance Statement (PICS).	ETSI TS 103 096-1	V1.1.1		
32	Intelligent Transport System (ITS) ; Testing ; Conformance test specification for TS 102 867 and TS 102 941 ; Part 2 : Test Suite Structure and Test Purpose (TSS&TP).	ETSI TS 103 096-2	V1.1.1		
33	Intelligent Transport System (ITS) ; Testing ; Conformance test specification for TS 102 867 and TS 102 941 ; Part 3 : Abstract Test Suite (ATS) and Protocol Implementation eXtra Information for Testing (PIXIT).	ESTI TS 103 096 -3	V1.1.1		
34	Intelligent Transport System (ITS) ; Testing ; Conformance test specification for TS 102 867 and TS 102 941 ; part 4 : Validation report.	ETSI TS 103 096 -4	V1.1.1		
35	Intelligent Transport System (ITS) ; Testing ; Conformance test specification for Geonetworking Basic Transport Protocol (BTP) ; Part 1 : Test requirements and proforma Protocol Implementation Conformance Statement (PICS).	ETSI TS 102 870-1	V1.1.1		
36	Intelligent Transport System (ITS) ; Testing ; Conformance test specifications for Geonetworking Basic Transport Protocol (BTP) ; Part 2 : Test Suite Structure and Test Purpose (TSS&TP).	ETSI TS 102 870-2	V1.1.1		
37	Intelligent Transport System (ITS) ; Testing ; Conformance test specifications for Geonetworking Basic Transport Protocol (BTP) ; Part 3 : Abstract Test Suite (ATS) and Protocol Implementation eXtra Information for Testing (PIXIT).	ETSI TS 192 870-3	V1.1.1		
38	Intelligent Transport System (ITS) ; Testing ; Conformance test specifications for Geonetworking ITS G5 ; Part 1 : test requirements and proforma Protocol Implementation Conformance Statement (PICS).	ETSI TS 102 871-1–	V1.3.1		
39	Intelligent Transport System (ITS) ; Testing ; Conformance test specifications for Geonetworking ITS G5 ; Part 2 : Test Suite Structure and Test Purpose (TSS&TP).	ETSI TS 102 871-2	V1.3.1		

No.	Norm	Reference	Version	Use case	Organisation
40	Intelligent Transport System (ITS) ; Testing ; Conformance test specifications for Geonetworking ITS G5 ; Part 3 : Abstract Test Suite (ATS) and Protocol Implementation eXtra Information for Testing (PIXIT).	ETSI TS 192 871-3	V1.1.1		
41	Intelligent Transport System (ITS) ; Testing ; Conformance test specification for Cooperative Awareness Messages (CAM) ; Part 1 : Test requirements and proforma Protocol Implementation Conformance Statement (PICS).	ETSI TS 102 868-1	V1.3.1		
42	Intelligent Transport System (ITS) ; Testing ; Conformance test specification for Cooperative Awareness Messages (CAM) ; Part 2 : Test Suite Structure and Test Purpose (TSS&TP).	ETSI TS 102 868-2	V1.3.1		
43	Intelligent Transport System (ITS) ; Testing ; Conformance test specification for Cooperative Awareness Messages (CAM) ; Part 3 : Abstract Test Suite (ATS) and Protocol Implementation eXtra Information for Testing (PIXIT).	ETSI TS 102 868-3	V1.3.1		
44	Intelligent Transport System (ITS) ; Testing ; Conformance test specification for Decentralized Environmental Notification Messages (DENM) ; Part 1 : Test requirements and proforma Protocol Implementation Conformance Statement (PICS).	ETSI TS 102 869-1	V1.1.1		
45	Intelligent Transport System (ITS) ; Testing ; Conformance test specification for Decentralized Environmental Notification Messages (DENM) ; Part 2 : Test Suite Structure and Test Purpose (TSS&TP).	ETSI TS 102 869-2	V1.1.1		
46	Intelligent Transport System (ITS) ; Testing ; Conformance test specification for Decentralized Environmental Notification Messages (DENM) ; Part 3 : Abstract Test Suite (ATS) and Protocol Implementation eXtra Information for Testing (PIXIT).	ETSI TS 102 869-3	V1.1.1		
47	Conformance test specifications for Transmission of IP packets over GeoNetworking (GN6)	ETSI TS 102 859			
48	Architecture of conformance validation framework	ETSI TR 103 099	V.1.3.1		

Other test-related norms

	Name	Title	Subtitle
49	TR 103 099	Architecture of conformance validation framework	
50	TR 103 101	Test suite validation;	Access technology support ISO 21218
51	TS 102 859-1	Testing; Conformance test specifications for Transmission of IP packets over GeoNetworking;	Part 1: Test requirements and proforma Protocol Implementation Conformance Statement (PICS).
52	TS 102 859-2	Testing; Conformance test specifications for Transmission of IP packets over GeoNetworking;	Part 2: Test Suite Structure and Test Purpose (TSS&TP).
53	TS 102 859-3	Testing; Conformance test specifications for Transmission of IP packets over GeoNetworking;	Part 3: Abstract Test Suite (ATS) and Protocol Implementation eXtra Information for Testing (PIXIT).
54	TS 102 916-1	Test specifications for the methods to ensure Cooperative ITS G5 coexists with RTTT DSRC;	Part 1: Protocol Implementation Conformance Statement (PICS)
55	TS 102 916-2	Test specifications for the methods to ensure Cooperative ITS G5 coexists with RTTT DSRC;	Part 2: Test Suite Structure and Test Purpose (TSS&TP).
56	TS 102 916-3	Test specifications for the methods to ensure Cooperative ITS G5 coexists with RTTT DSRC;	Part 3: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT)
57	TS 102 917-1	Test specifications for the channel congestion control algorithms operating in the 5.9 GHz range;	Part 1: Protocol Implementation Conformance Statement (PICS)
58	TS 102 917-2	Test specifications for the channel congestion control algorithms operating in the 5.9 GHz range;	Part 2: Test Suite Structure and Test Purposes (TSS & TP).
59	TS 102 917-3	Test specifications for the channel congestion control algorithms operating in the 5.9 GHz range;	Part 3: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT)

8. VMS use case and in-vehicle signage

No.	Norm	Reference	Version	Use case	Organisation
60	Intelligent transport systems — Cooperative ITS - Data exchange specification for in-vehicle presentation of external road and traffic related data	ESC ISO/DTS 17425	Vote scheduled for August 2015	C Case	ESC & ISO
62	Intelligent transport systems — Cooperative ITS - Dictionary of in- vehicle information (IVI) data structures	ESC ISO/PRF TS 19321	Voted, in publication	C Case	ESC & ISO
63	Intelligent transport systems — Cooperative ITS - Road Work Application	study*	study	B Case	
65	Intelligent transport systems — Cooperative ITS - Contextual speed	ESC ISO/DTS 17426*	Vote scheduled for August 2015	C Case	ESC & ISO

* see comments below in chapter 11

9. A few grounds of justification

The following fact was considered for interoperability: "two projects that use the CAM and DENM norms are not interoperable as soon as their versions of CAM and DENM are not respectively compatible."

No.	Element of justification (interoperability / main choices / choice of prior versions)
1	French motorways operated under a concession use electronic tollbooths that satisfy the ESC-DSRC norms in a frequency band (5.8 GHz) close to that of the ITS-G5 systems (5.9 GHz). The standard (EN 302 571) defining the emission masks for ITS-G5 systems takes into account the proximity of this ESC-DSRC band and defines the levels of emission mitigations (TS 102 792 and TR 102 960). Version 1.1.1 has been used in SCOOP, but SCOOP Partners agreed to consider further version appropriate (among which version 1.2.1)
4	Version **1.1.1**, which predates version 1.2.0, the last version published, was chosen because the CAM and DENM versions chosen cite as reference the version 1.1.1.
7-8	It was decided to take the latest EN versions published by ETSI (mandate m453) for the **CAM and DENM** messages, which are respectively **1.3.2 and 1.2.2**. The notable difference between the old CAM and DENM versions 1.3.0 and 1.2.0 and the new versions 1.3.2 and 1.2.2 is the recent insertion of a container dedicated to announcing electronic tollbooths (ESC DSRC) in these messages. This container will make it possible for the (motorway) infrastructure to announce these tollbooths (position, etc.) so receiving vehicles can start the appropriate mitigation techniques (e.g., reduce power and increase the frequency of messages).
23	No work item is recorded in ESC or ISO even if the need is urgent. This is the result of informal discussions during the meetings without any decision. The work to perform could be an initiative to initiate in CN16.

10. Comparative table of versions chosen in other projects

This table lists the references and versions of the norms and standards chosen in the other known projects or in the roadmap of the C2C consortium.

Table established by the SCOOP partners (dated the deliverable's publication date)

No.	Reference	SCOOP version	Corridor version (Germany)	Eco-AT Version (Austria)	C2C recommendation	Compass 4D version (France)	SISCOGA version (Spain)
1	EN 302 571	1.2.1 (2013-09)	1.2.0	Not listed	1.2.1		
2	EN 302 663	1.2.1 (2013-07)	1.1.1	Not listed	1.2.0	1.2.1	
3	TS 102 724	1.1.1 (2012-10)		Not listed	1.1.1		
4	TS 102 792	1.1.1 (2012-10)		Not listed			
5	EN 302 636-4-1	1.2.1 (2014-07)	1.2.0	1.2.1 (2014-07)	1.2.0	1.2.1	
6	EN 302 636-5-1	1.2.1 (2014-08)	1.1.1	Not listed	1.2.0	1.2.1	
7	EN 302 637-2	1.3.2 (2014-11)	1.3.0 (not compatible with 1.3.2)	Final Draft 1.3.1 (2014-09) (compatible * with 1.3.2)	1.3.0 (not compatible with 1.3.2)	1.3.2	1.3.1 (Compatible with 1.3.2)
8	EN 302 637-3	1.2.2 (2014-11)	1.2.0 (not compatible with 1.2.2)	Final Draft 1.2.1 (2014-09) (compatible * with 1.3.2)	1.2.0 (not compatible with 1.2.2)	1.2.4	1.2.0 (compatible* with 1.2.1)
9	EN 302 931	1.1.1 (2011-07)	1.1.0	Not listed	1.1.1		
10	TS 102 894-1	1.1.1 (2013-08)	See TS 102 894-2	Not listed	Not listed		
11	TS 102 894-2	1.2.1 (2014-09)	1.1.1	Not listed	1.1.1	1.1.6	
12	TR 102 965	1.1.1 (2013-03)		Not listed			
13	TS 101 539-1	1.1.1 (2013-08)	Not listed	Not listed	Not listed		
14	TS 102 638	1.1.1 (2009-06)		Not listed			
15	TS 102 940	1.1.1 (2012-06)		Reference without version	1.1.1		
16	TS 102 941	1.1.1 (2012-06)		Reference without version	1.1.1		

| 17 | TS 102 731 | 1.1.1 (2010-09) | | Reference without version | | | |
| 18 | TR 102 893 | 1.1.1 (2010-03) | | 1.1.1 | | | |

*Compatibility with the SCOOP version

Only the boxes for which there is known information have been filled in. An empty box does not necessarily mean that the project in question has not listed this reference.

11. Shortcomings identified in the norms

11.1 D8 use case "unmanaged blockage"

This use case doesn't correspond to any cause code / subcause code pair. We had to use a pair (9/0) signifying "bad surface condition of the roadway." In the absence of a dedicated message in the norm, we use an "obstacle" type cause code. This can pose interoperability problems during cross-tests and should be corrected for mass deployment. The development of the norm DEN (EN 302 637-3) is apportioned in the norm TPEG-TEC (TS 18234-9) but centred on the car as transmitter. This can make sense when the vehicle transmits, but becomes incomprehensible when the infrastructure transmits.

11.2 B2 use case, sub-case "emergency vehicle approaching"

In the same way as the previous case, the since the norm is not explicit, the use by the project of the "95/0" cause/subcause can be a source of ambiguity. There can be confusion between priority vehicles as defined by the highway code (ambulance, police) and operators' service vehicles. This point should be resolved for mass development.