D2.5 CIMEC – C-ITS standardization requirements for the urban environment

WP2 – Potential C-ITS solutions and standardization for cities

Osama Al-Gazali, Josef Kaltwasser

ALBRECHTCONSULT, THEATERSTRASSE 24, D-52062 AACHEN, GERMANY

cimec

Cooperative ITS for Mobility in European Cities

www.cimec-project.eu

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 653637

Deliverable No.		D 2.5 (Report extension: recommendations on further standardisation)	
Work package No.	WP2	Work package Title	Potential C-ITS solutions and standardisation for cities
Task No.	T 2.4	Task Title	C-ITS standardisation requirements for the urban environment
Date of preparation of this version:		30/10/2016	
Authors:		Osama Al-Gazali & Josef Kaltwasser	
Status (F: final; D: draft; RD: revised draft):		F	
File Name:		CIMEC-D2.5	
Version:		00-00-03	
Task start date and duration		01/12/2015 – 30/11/2016	

Revision History

Version No.	Date	Details
1.0	21/11/2016	First version to be circulated among partners for feedback
2.0	30/11/2016	Second version to be circulated among partners for feedback
3.0	01/12/2016	Final version

TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

cimec
Cooperative ITS for Mobility in European Cities

1. Introduction

1.1 Task description

This document (D 2.5) is an extension of the task report (D 2.4). This extension includes the outcome of activities which, on the one hand, has validated / consolidated the outcomes of the desk research carried out to create a short-list of relevant standards for the urban ITS domain and propose a set of recommendations. On the other hand, has provided further standardisation recommendations of relevance.

The initial short-list documented in D 2.4 was exposed to expert opinion within the projects as well as to external review as part the organised workshops. The suggested recommendations considered the view of experts, who are involved in the standardisation development processes, cities as well as one supplier who participated. In this regard, two workshops facilitated the discussion as follows; one a dedicated standardisation workshop in Brussels (12.09.2016) and a workshop session in Barcelona (14.11.2016) within the CIMEC-CODECS CITY POOL framework.

The scope of Task 2.4 quoted from the technical appendix is as follows:

''This task will clarify how C-ITS will be integrated in cities' ITS architecture and identify standardisation issues that currently are not reflected. This could relate to (sub-) systems, communication or processes. Thereby it is important to highlight the significance in relation to existing (regional) ITS standards (OCIT, OTS, UTMC, DATEX II etc.) and urban procurement processes.

Furthermore, in this context, an evaluation of relevant ITS and C-ITS standards based on the list *Release 1 standards for Cooperative ITS by CEN and ISO (N196)* will be expected which have to be influenced from a city's perspective and recommendations for further standardisation work will be indicated.

These two workshops will consider cities' standardisation requirements and should identify where and how further standardisation work has to be done. Apart from AC/OCA, CC/UTMC, Polis and the core cities standardisation experts from the relevant Standard Development Organisations' technical committees on ITS (ISO, CEN, ETSI, …) and the Car-2-Car Communication Consortium will participate.

Valuable feedback and recommendations from these workshops will extend the report D 2.4 (D 2.5).''

1.2 Approach

The topic of standardisation in the urban domain is (technically as well as organisationally) complex, as urban operators are typically not able to – or at least significantly limited in their capacity to – actively *contribute* to standardisation. This is not their role and very few urban road authorities have an

organisational size that would provide the required resources to do so. Their perception is rather that of a "*customer*" of standardisation, i.e. available standards are used as they stand. In this situation it is not surprising to hear frequent complaints about standards not addressing urban requirements well. In many cases, existing standard are not used at all since they are not known by those carrying out relevant business processes (e.g. procurement).

To limit complexity of Task 2.4 in this difficult setting, the focus of this report is on systems, processes and communications (interfaces) at the 'upper' layers of conceptual abstraction, i.e. those technical specifications that would need to be actively addressed when specifying any kind of deployment plan for C-ITS services, in particular when writing procurement documents.

Our desk research for pre-selecting relevant standards was based on various existing and relevant lists of standards that had been produced prior to the CIMEC project. The main starting point, as mentioned in the technical appendix, was the list of *Release 1 standards for Cooperative ITS by CEN and ISO*. Meanwhile, the European Commission's C-ITS Platform's working group 7 (Standardisation) had published a list with an *overview of the standards being used within C-ITS deployments initiatives in Europe* and we merged these two as a starting point.

The result was then matched against the standardisation programme for urban standardisation that has been published by project team PT1701 as the basis for the work program for CEN's new working group WG17 on Urban ITS. Other relevant sources were also cross-checked, e.g. deliverable D 6.5.1 of the EU co-funded TEAM project.

The second step then was to assess the standards in this list from an urban road operator's perspective. We wanted to find those standards that road operators have to actually work with in the process of deploying, operating and maintaining C-ITS services. While the list of standards that are relevant for system to work is a long one, the list of those that the road operator will actually have to work with is likely to be comparatively much more slender.

As an example, consider procurement for a business process that implies using mobile phones. While hundreds of standards may be essential for such a mobile phone to work nowadays, a procurement document may be rather short and just listing the type of network (e.g. LTE) and maybe some service parameters like transmission speed. On the other hand, if a road operator wants to specify access to real-time data for third parties via the Internet, he would for example specify detailed requirements regarding the data profile to be provided, which would mean we would need some expertise in the application of relevant data standards (in this case this could be a DATEX II data profile based on the CEN/TS 16157 standard).

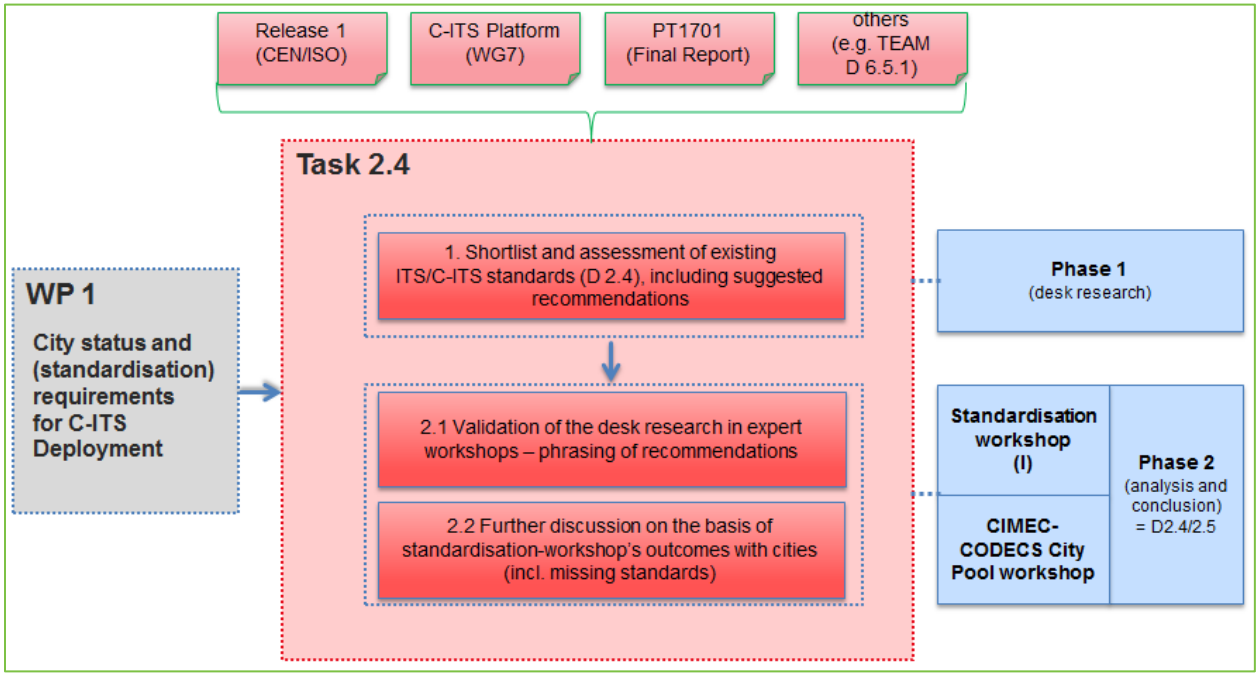
In Task 2.4 (desk research-part), we strived to find this category of standards, where road operators in their own business processes would need to actively work with the standard, and subsequently also

would depend on these standards providing the required features. This is exactly the set of standard that would have to be matched against the requirements for urban C-ITS deployment. It is important to highlight in the selection process for our initial short-list of relevant standards described above that we processed input from the "C-ITS" domain as well as from the "Urban ITS" domain, since the requirements for urban C-ITS may both affect standards for the "new" (C-ITS) system components as well as legacy systems, that the new components need to interact with.

Since all this is rather abstract, we have chosen one example for a C-ITS deployment in a use case based on existing legacy systems; the bus prioritisation at a signalised intersection. Note that the described assessment and selection process has of course not been limited to this scenario. The scenario is simply used to highlight the impact and relationship between different standards in one concrete example.

The following picture shows how Task 2.4 has been conducted in two phases.

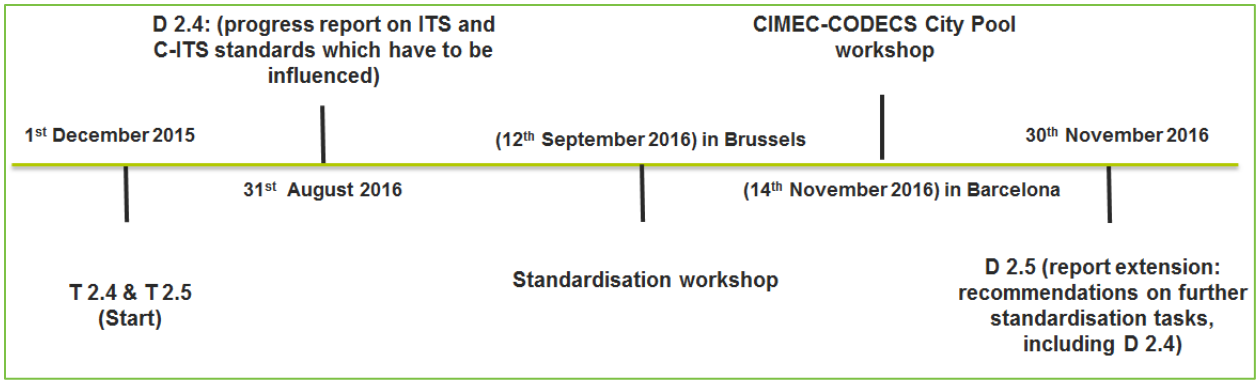
Figure 1: Approach of Task 2.4



During the initial scan and assessment of the existing urban C-ITS standards from a city point of view, the list of identified standards were filtered first by the expert judgement of the project team in an internal assessment step. We developed an assessment scheme based on criteria reflecting the actual use of standards in urban ITS (see section 3.2).

In the second phase (analysis and conclusion), we complemented this assessment with the opinion of standardiastion experts and other stakeholders (cities and suppliers) in two workshops to provide input to / validate our recommendations regarding required actions (see timeline below). The challenge of bringing adequate stakeholders - in relatively short notice - to two consecutive workshops led to a change of strategy for the second event. Instead of having two dedicated standardisation workshops, the second was integrated in the CIMEC-CODECS City Pool workshop. This proved to be a very good opportunity to share and get feedback on the outcomes of the first workshop with a broader range of cities and suppliers. The impact of the CIMEC activities on future standardisation has been addressed by means of recommendations as a contribution to the work program of WG16 (C-ITS) new WG17 (Urban) of CEN278, in operation since November this year (2016).

A schedule for the activities, deliverables and organised workshops is depicted below:



1.3 Target audience

This report is targeted at:

- Urban road operators as stakeholder in the deployment of C-ITS services/products/components
- ITS/C-ITS Suppliers
- National, regional and urban road authorities involved in standardisation
- Standards defining organisations
- The European Commission

1.4 Report structure

After this introduction (section 1), the report is structured into three sections:

- Section 2 introduces relevant aspects of the urban environment that need to be understood when considering the role and the use of standards in this urban environment.
- Section 3 then describes the process adopted in Task 2.4 to create an initial short list of C-ITS standards with string relevant for the urban C-ITS domain from a road operator's perspective.
- Section 4 finally concludes results and makes recommendations that would help to better address standardisation in order to foster urban C-ITS deployment.

2. The urban ITS/C-ITS environment

2.1 The specifics of urban ITS/C-ITS

2.1.1 City requirements

This section tries to provide a better understanding of the specifics of the urban road traffic and transport environment, as compared e.g. with the operation of an inter-urban trunk road network. In general, urban scenarios will be described as a starting point for identifying relevant standards and specific standardisation needs from a city perspective.

2.1.2 Why a city is different

Traffic in an urban environment faces a complex road network topology and furthermore involves a variety of modes of transport. Traffic is volatile, with vehicles entering and leaving the network at every possible point. Network geography and topology are also volatile with many short-term, temporary modifications (road work, street work, special permissions…) all over the place and being maintained by multiple organisations / authorities. This creates a challenge that is very different to the well-controlled motorway environment and consequently implies unprecedented accuracy in positioning and granularity in location referencing to enable cooperative services. A typical example is the position of a cyclist crossing an intersection. The main factors/aspects to summarise the specific city environment are:

- Complex network
- Difficult location network on high granularity
- Network geography and topology constantly changing
- Different overlaying networks of different modes of transport
- Very different type of users with very different behaviour (soft modes, vulnerable road users, animals…)
- Difficult communication environment (urban canyons, multi-path…)

But this 'only' addresses the main technical challenges of the urban environment. Maybe more relevant are the organisational characteristics of cities and their differences to other networks:

- They generally have clear transport policy objectives (usually part of a wider range of policies addressing all aspects of urban life)

- European cities have very different history (with corresponding effects on technology, processes, etc.), and consequently different organizational and operational structure
- Available resources are often extremely limited (personnel, money, ...)
- Different patterns of connection with surrounding regions (e.g. agglomeration, isolated rural environment or connection to inter-urban road network) and associated geographical patterns

2.1.3 Requirements

WP 1 of CIMEC highlighted the variety of challenges that cities face when deploying C-ITS by conducting eight local and regional workshops. These workshops provided valuable standardisation requirements since deficiencies of existing standards and standardisation gaps were frequently recurring statements when it came to describing C-ITS deployment obstacles.

One major theme – also recurring in all input material (C-ITS platform, PT1701…) – is the lack of location referencing standards for the urban road environment that are on one hand of sufficiently fine granularity while at the same time are pragmatic and easy to implement, both in technical as well as organisational terms. Intersection safety applications of C-ITS are frequently mentioned, which require very fine granularity in intersection topology and geography as well as lane accuracy in vehicle positioning. Cities today have neither the technical system to manage such data nor the organisational processes to maintain it, not to mention the substantial resources that would be required to manage the high frequency of temporal changes in such a data set (e.g. due to street works or road closures).

A further technical challenge would be to connect C-ITS enabled infrastructure components to the traffic control centres. Cities have worked hard for a long time to achieve an open-system architecture for connecting (traditional legacy) roadside equipment to their traffic centres in a vendor-mixed environment. Success in this struggle still differs significantly from region to region. C-ITS infrastructure now puts a whole set of new requirements on this interface, effectively demanding a complete 'new generation' of interface specifications / standards, as recent supplier announcements of the various industry standardisation organisations reveal. Some cities fear that this dynamic development might easily turn their procurement processes upside down.

In general, there seems to be a strong concern that C-ITS – as an innovative technology on the threshold from research to deployment – might not be sufficiently pragmatic and mature yet to provide feasible migrations paths and smooth connectivity with legacy systems, which many urban road operators see as a mandatory requirement for C-ITS deployment. A further concern is the lack of knowledge and reliable information regarding privacy and security issues with C-ITS systems in practice. C-ITS by definition and by name is about connecting systems that so far had not been connected. They are connected to share data on an unprecedented level of volume and granularity, and new connections always mean new

attack vectors, where data volume and granularity – especially in case of personalised data – have a privacy implication, which many urban road operators at this moment find hard to assess.

To address all these challenging issues, almost all cities expressed a strong desire for better planning support in form of guidance documents and best practice.

More details can be found in the WP1 deliverable D 1.1.

2.1.4 Use cases

In its aim to structure the urban environment and elicit requirements – not only but also regarding standardisation – WP 1 prepared a set of use cases. These use cases were analysed in order to derive evaluation criteria for the relevance of standards as presented in section 3 of this report.

WP 1 use cases:

UC1: Perform individual routing of vehicles
UC2: In-vehicle signalling
UC3: Management of loading and unloading areas for distribution vehicles
UC4: Control the access of heavy goods vehicles with dangerous goods to tunnels
UC5: Regulation of access to free lanes for electrical vehicles
UC6: Give green lights for police and emergency vehicles
UC7: Traffic light management
UC8: Give green lights for public transport vehicles
UC9: Green waves for cyclists
UC10: Parking management
UC11: Inform about incidents in the road network and control access to these areas
UC12: Inform about emergencies in the road network and control access to these areas
UC13: Control access to given roads for not emission-free cars on days with poor air quality
UC14: Enforcement of the speed of vehicles running close to schools and kindergartens when children are coming or leaving the areas
UC15: Transponder technology for vulnerable road users

The use case 8 (Green lights for public transport vehicles, bus prioritisation at a signalised intersection is in particular considered under this generic use case) is used throughout this report as an example scenario to contextualised the impact of standards in the urban domain and to highlight the suggested standardisation recommendations.

2.2 Why standardisation?

The term "standard" is one of those words that appear to have immediate, intuitive semantics and would not need further rigour in formal specification or textual definition. This seemingly common perception seems to be dangerous and simply wrong. Actually, a lot of characteristics attributed to

standards are definitely not clear or self-explanatory and some seem to be de facto contradicting the actual semantics. As an example, many users think that European Norms are mandatory for use in a legal sense, whereas all Standards Developing Organisations (SDOs) constantly explain that the use of standards is voluntary.

Therefore, it is crucial to clarify the terminology that will be used in this report. The SDOs themselves define a standard as follows:

"A standard is a document that provides requirements, specifications, guidelines or characteristics that can be used consistently to ensure that materials, products, processes and services are fit for their purpose"
(source: ISO [http://www.iso.org/iso/home/standards.htm])

Another definition is provided by ETSI [http://www.etsi.org/standards/what-are-standards]:

"A standard is a document that provides rules or guidelines to achieve order in a given context"

''Services are fit for their purpose'' in the first definition and ''achieve order in a given context'' in the second definition addresses a standard as a requirements document that facilitates the interoperability of products (system, component, software) from different vendors, although this interpretations fits mainly to standards that address the specification of characteristics of such systems, components, software.

Other standards address other aspects of the environment of service deployment, e.g. test standards obviously help in specifying acceptance procedures in procurement whereas process standards may help in setting up appropriate organisational structures for developing, deploying and operating / maintaining C-ITS services and the system required for this.

It is not sufficient only to understand that nature and the scope of a standard, it is sometimes also important to understand the organisational background that has produced a standard. We have three officially accredited SDOs on regional (national), European and international level. In Europe these are the European Committee for Standardisation (CEN), the European Committee for Electrotechnical Standardisation (CENELEC) and European Telecommunications Standards Institute (ETSI), commonly often referred to as European Standards Organisations (ESOs). Similar structures exist on National level (national organisations in Europe are members of the ESOs) and on international level (ISO, IEC, ITU). The interaction between levels – e.g. between CEN and ISO – is usually handled in dedicated treaties, in case of CEN and ISO in the Vienna Agreement.

But there are many other SDOs which are not part of governmental treaties, typically founded as Non-profit organisations by private sector stakeholders that had an incentive to create such thematic

standardisation organisations. Such SDOs can be regional or global, and they typically operate procedures that are much leaner and faster than the 'official' SDOs.

Up to very recent times, traditional urban ITS was entirely in the hands of such regional, thematic SDOs (e.g. UTMC in the UK, or ODG in continental Europe), but CEN has recently launched a new working group on "Urban ITS" (CEN TC278 WG17). C-ITS standardisation has traditionally been split between ETSI and ISO (the ISO working is actually a joined CEN/ISO WG).

It is obviously of great importance to be aware of who has produced a standard. Cities prefer standards that are widely supported by their suppliers, since that eases the critical interaction in the phase of system design and specification. Hence, standards provided by industry-led SDOs with strong contribution from the supply chain create stronger trust in a city than international standards that may have their main support by overseas industry and users, i.e. it is also interesting to look at what aspects the standard is addressing and on what geographical scope it has been defined. Users would prefer standards in all places that are as easy to cite and use as in the LTE example stated above. It is nevertheless important to understand that "plug & play" standards come at extremely high cost that are typically only justifiable for large volume markets. Standards for ITS infrastructure are typically of a nature that provides a framework that requires tailoring for specific system installations. These standards provide high flexibility, but they need skills and resource in their application for system specification and procurement.

2.3 Role of standards in urban procurement

With the rapidly growing digitalisation of many domains of traffic and transport management, ITS/C-ITS standards are obviously playing an increasingly important role in minimising associated risks of public procurement of innovative cooperative solutions / services, which are for instance:

1. They are not put on the market by supplier (commercialised phase), where economy of scale is awaited
2. Failure of delivering the innovation as foreseen (i.e. not at all, with reduced functionality or/and too higher costs or with long delay).

From a public road authority perspective, the use of standardised systems, interfaces and processes that are well supported by the market significantly reduce cost of buying equipment, enhance confidence and trust in reliability, safety and quality of products and services.

From a European perspective, European standardization activities and associated legislations support the European Union’s policy of a single transport market (EC, WHITE PAPER: Roadmap to a Single European Transport Area – Towards a competitive and resource, 2011). Interoperability standards

specifically aim at enabling competitive markets and procurement processes, preventing vendor lock-in problems that often lead to poor procurement results.

A huge number of standards is already today available on the market at different levels, granularity and themes, but many of them are not used partly due to unawareness of their existence. Therefore, it is important to highlight the PT 1701 discussion on the issue of raising public and local road authorities' awareness of standards that can have a positive impact on procurement processes.

3. Standards in urban ITS/C-ITS

3.1 Current ITS/C-ITS standardisation framework for the urban domain

The fast development of cooperative ITS technologies and the first ongoing inter-urban large-scale deployment of C-ITS have now raised attention to the urban environment. Since cooperative systems require a new way of communication and implementation processes, standards are crucial to ensure on the one hand interoperability and on the other hand to enable migration paths for the existing ITS infrastructure.

The European Commission takes a prominent role by establishing a cooperative framework of relevant C-ITS stakeholders including national road authorities (the *C-ITS Platform*) in order to create a common European C-ITS road-map, also addressing standardisation needs. From a standardisation perspective, the previous and new European Mandates M/453 and M/546 – issued on 6/10/2009 and 12/02/2016 respectively – together is a mechanism for requesting further standardisation projects in support of ITS directive 2010/40/EU and the objective of single transport market at the strategic level (EC, WHITE PAPER: Roadmap to a Single European Transport Area – Towards a competitive and resource, 2011).

The following standardisation initiatives and activities are focussing or at least addressing the urban C-ITS context:

1. The operational launch of WG 17 (TC278: WG17 Urban ITS) in November 2016
2. The establishment of new WG, within the C-ITS platform, that focuses on the Urban context (WG: C- ITS, public transport and automation in urban areas) in 2016
3. Relevant European projects and support actions such as CIMEC (2015-2017), CODECS (2015-2018), TEAM (2012-2016)
4. Industry led, C-ITS related standardisation efforts of regional standardisation associations such as ODG (OCIT-O V3.0)
5. C-ITS Release 1 list of standards by CEN/ISO in 2013
6. Final joint CEN/ETSI-Progress Report to the European Commission on Mandate M/453 in 2013

3.2 Assessment of relevant C-ITS/ITS standards

One key contribution of D 2.4[1] is the assessment of relevant standards from an urban road operator's perspective. The assessment consists of three phases; pre-selection, pre-processing and assessment, and prioritisation. These phases are described in this chapter.

3.2.1 Pre-selection of relevant ITS/C-ITS standards

In the first phase of this assessment process, existing urban ITS/C-ITS standards in accordance with the associated standardisation activities mentioned in section 3.1, and the accumulated knowledge of relevant European projects (see appendix 1), have been collected. A total of 148 standards were identified as pre-selection list, and a few important guidelines were distinguished within this list.

3.2.2 Pre-processing and assessment

In the second phase, the pre-selected list of standards was filtered according to internal assessments and expert judgement, see figure (2).

This pre-selection list was shortened under the assessment that public road authorities should work with:

- relevant upper layer-standards (security aspect is not included overall out of scope).
- standards that impact the existing business process of urban road operators, e.g. ISO/TS 17931: Intelligent Transport Systems - Extension of map database specifications for Local Dynamic Map for applications of Cooperative ITS.
- other needed standard and guidelines, when procuring cooperative systems, components, services and/or products, e.g. CEN/ISO TR 17427: Roles and responsibilities in the context of co-operative ITS based on architecture(s) for co-operative systems.

After that, assessment criteria were identified – as presented in table 1 – and used for further shorting of most important standards (59 standards). Standards, which belong to the same group, such as DATEX II and TPEG, are aggregated.

[1] In this deliverable (D 2.5), four additional technical specifications were identified to capture further regional differences, see appendix 3

Figure 2: Illustration of the assessment processes

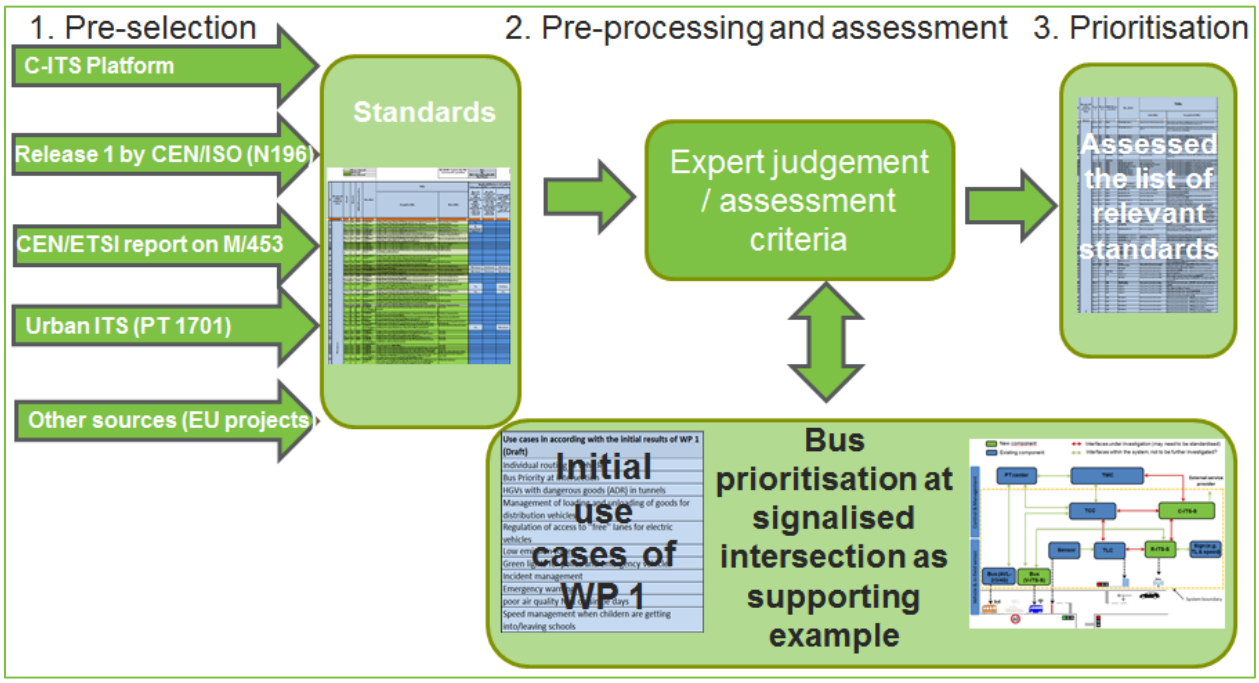


Table 1: Assessment criteria for the short list of standards[2]

#	Criteria	Description
1	**Interoperability with legacy system**	Important requirement to open up pragmatic migration paths in C-ITS service deployment
2	**Convergence with existing services (functional)**	Road Operators provide various service via multiple end user channels; new C-ITS services will partly have overlap with existing services and Road Operators must ensure consistency between the information provided to end users via multiple channels
3	**Consistent terminology (data dictionary analogy)**	Consistent data structures across system boundaries are a major requirement for system integration; new C-ITS systems have to make sure that they fit consistently into the overall structure
4	**Compliance with service policies and business processes**	Road Operators already provide services and they have their own policies and business processes in delivering these services, defining roles and responsibilities, etc; new C-ITS services have to fit into this scheme
5	**Relevance of subject matter for public road authority's processes and requirements**	We want to identify standards that need to be actively addressed by the road operator when deploying C-ITS services; technical standards (esp. communication standards) of lower conceptual layers may be important for systems to work, but do not need to be particularly addressed in business processes

[2] Assessment will consider standards and technical specification from SDOs and regional stakeholders

3.2.3 Prioritisation

In the third and the last phase, the short-list of 40 standards were prioritised and presented at the standardisation workshop in Brussels. The outcome of this workshop included refinement of the list of standards from the second phase. In addition, four additional technical specifications were identified to capture further regional difference, see table 2 below.

Table 2: Short of key urban ITS/C-ITS standards[3]

#	SDOs	Document reference	Title	Applicability to CIMEC use cases[4]
1	ETSI	TS 101 556-3 V1.1.1	Intelligent Transport Systems (ITS); Infrastructure to Vehicle Communications; Part 3: Communications system for the planning and reservation of EV energy supply using wireless networks	UC 10, UC 11, UC 12, UC 13 and UC 14
2	ETSI	EN 302 665 V1.1.1	Intelligent Transport Systems (ITS); Communications Architecture	All UCs
3	ETSI	EN 302 637-2 V1.3.0	Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Part 2: Specification of Cooperative Awareness Basic Service	All UCs
4	ETSI	TS 102 894-2 V1.1.1	Intelligent Transport Systems (ITS); Users and applications requirements; Applications and facilities layer common data dictionary	All UCs
5	ETSI	EN 302 895 V1.1.1	Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Local Dynamic Map (LDM)	All UCs
6	ETSI	TS 102 637-1 V1.1.1	Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Part 1: Functional Requirements	All UCs
7	ETSI	EN 302 637-3 V1.2.0	Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Part 3: Specifications of Decentralized Environmental Notification Basic Service	All UCs
8	CEN	TS 16157 (DATEX II)	Road transport and traffic telematics - DATEX II data exchange specifications for traffic management and information	UC 1, UC 2, UC 3, UC 4, UC 5, UC 6, UC 10 and UC 11
9	ISO	TS 19091 (Spat/MAP)	Intelligent transport systems -- Cooperative ITS -- Using V2I and I2V communications for applications related to signalized intersections	UC 1, UC 2, UC 6, UC 7, UC 8 and UC 9
10	ISO	24100	Intelligent transport systems -- Basic Principles for Personal Data Protection in Probe Vehicle Information Services	UC 7, UC 11, UC 12 and UC 13

[3] White background indicates standards, while grey is an indication of relevant guidelines

[4] UC is an abbreviation to use case

#	SDOs	Document reference	Title	Applicability to CIMEC use cases[4]
11	ISO	TS 15638	Framework for cooperative telematics applications for regulated commercial freight vehicles (TARV)	UC 1, UC 2, UC 3, UC 4, UC 6, UC 10 and UC 12
12	ISO	TS 18234 - TPEG1	Intelligent Transport Systems - Traffic and Travel Information (TTI) via Transport Protocol Experts Group, Generation 1 (TPEG1)	UC 1, UC 2, UC 3, UC 4, UC 5, UC 7, UC 10, UC 11, UC 12 and UC 13
13	ISO	TS 21219 - TPEG2	Intelligent transport systems -- Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2)	UC 1, UC 2, UC 3, UC 4, UC 5, UC 7, UC 10, UC 11, UC 12 and UC 13
14	ISO	14827	Data interfaces between centres for transport information and control systems	UC 1, UC 2, UC 3, UC 4, UC 5, UC 7, UC 10, UC 11, UC 12 and UC 13
15	ISO	TS 17931	Intelligent Transport Systems - Extension of map database specifications for Local Dynamic Map for applications of Cooperative ITS.	UC 1, UC 2, UC 3, UC 4, UC 5, UC 7, UC 9, UC 11, UC 12, UC 13, UC 14
16	ISO	TS 14823	Traffic and travel information - Messages via media independent stationary dissemination systems -- Graphic data dictionary for pre-trip and in-trip information dissemination systems	UC 1, UC 2, UC 3, UC 4, UC 5, UC 7 and UC 14
17	ISO	25114	Probe data reporting management	UC 2, UC 7, UC 11, UC 12 and UC 13
18	ISO	22837	Vehicle probe data for wide area communications	UC 2, UC 7, UC 11, UC 12 and UC 13
19	ISO	29284	Intelligent transport systems -- Event-based probe vehicle data	UC 2, UC 7, UC 11, UC 12 and UC 13
20	CEN/ISO	TS 17425	Intelligent Transport Systems - Co-operative systems - Data exchange specification for in-vehicle presentation of external road and traffic related data	UC 1, UC 2, UC 6, UC 7, UC 8, UC 9 and UC 14
21	CEN/ISO	TS 17426	Intelligent Transport Systems - Cooperative Systems - Contextual speeds	All UCs
22	CEN/ISO	TR 17427	Roles and responsibilities in the context of co-operative ITS based on architecture(s) for co-operative systems	All UCs
23	CEN/ISO	18750	Intelligent Transport Systems - Cooperative ITS - Definition of a global concept for local dynamic maps	All UCs
24	CEN/ISO	19321	Intelligent Transport Systems - Cooperative ITS - Dictionary of In-vehicle Information (IVI) data structures	All UCs
25	CEN/ISO	17419	Intelligent Transport Systems - Cooperative Systems - Classification and management of ITS applications in a global context	All UCs
26	CEN/ISO	17423	Intelligent Transport Systems - Cooperative Systems - Application requirements for selection of communication profiles	All UCs
27	CEN/ISO	17429	Intelligent Transport Systems - Cooperative Systems - Profiles for processing and transfer of information between ITS stations for applications related to transport infrastructure management, control and guidance	UC 1, UC 3 and UC 11

#	SDOs	Document reference	Title	Applicability to CIMEC use cases[4]
28	OCIT- ODG	OCIT-O 3.0	Outstation technical specification for Traffic Controllers	UC 1, UC 2, UC 6, UC 7 and UC 8
29		OCIT-C 2.0	In-station communication interface between traffic control centres	UC 1, UC 3, UC 6, UC 7 and UC 11
30	RTIG (Guide)	RTIGT031	Centre-to-centre traffic signal priority request protocol	UC 2, UC 3 and UC 8
31		RTIGT030	Digital Air Interface Protocol	UC 1, UC 2, UC 3, UC 6, UC 7 and UC 8
32		RTIGT008	Radio Link Specification for RTI-driven Traffic Light Priority and Display Clear down	UC 1, UC 2, UC 3, UC 6 and UC 8
33	TRAFIK-VERKET	RSMP 3.1.2	RSMP – Communication protocol - road side equipment	UC 2, UC 4, UC 5, UC 6, UC 7, UC 8 and UC 9
34		RSMP++	Current revision of SXL: Signal exchange list	UC 2, UC 6, UC 7, UC 8 and UC 9
35	DIASER Protocol	DIASER NF P 99-071 (RevA01)	Data exchange to or from traffic light crossroads equipment and other operating equipment, involved in traffic control	UC 2, UC 6, UC 7, UC 8 and UC 9
36	UR:BAN (Guide)	-	Guidelines for the deployment of cooperative systems from public perspective	UC 1, UC 2, UC 3, UC 6, UC 7 and UC 11
35	ECo-AT (Guide)	-	SWP 2.1 Use Cases, Intersection Safety	UC 2, UC 6, UC 7, UC 8, UC 9
37	(BBV program) iVRI	Deliverable-F-iTLC-Architecture-v1.2	Cooperative Traffic Light Controllers architecture: a) TLC-FI (traffic light controller interface with ITS application) b) RIS (R-ITS-S interface with ITS application)	UC 2, UC 6, UC 7, UC 8 and UC 9
38		Deliverable-F-iTLC-Architecture-v1.3	Cooperative Traffic Light Controllers architecture: b) RIS (R-ITS-S interface with ITS application)	UC 2, UC 6, UC 7, UC 8 and UC 9
39		IVERA-APP	Cooperative Traffic Light Controllers architecture: c) Specific implementation of a TMS-IF, used for functional management in case the ITS application is	UC 2, UC 6, UC 7, UC 8 and UC 9
40	TRAFIK-VERKET	TDOK 2012:1171 (1.0)	System and component design ''Systemnummer och Komponentbeteckningar''	UC 2, UC 6, UC 7, UC 8 and UC 9

Additional ITS standards and technical specifications that address the CIMEC-use cases are in Appendix 6.

4. Conclusions

The process of Task 2.4 has created a short-list of standards that qualify as having one or both of the following characteristics:

a) The content of the standard has potential impact on artefacts or processes of the urban road operator when deciding to deploy C-ITS services/systems/components conforming with this standard.
b) Urban road operators intending to deploy services/systems/components conforming with this standard should express their functional requirements regarding this service/system/component, since the content of the standard could potentially have an impact on conformant services'/systems'/components' ability to fulfil these requirements. Where standards already exist, road operators would need to verify whether the standard enables/allows conformant services/systems/components to fulfil the requirements.

There is a general concern regarding the deployment of C-ITS in many cities that the resources required to respond to these two aspects go beyond their technical and/or financial capacity. We will address this in our recommendations, since this seems to be a potential blocker that could be addressed with adequate schemes, e.g. by providing co-funding for C-ITS roll-out or by dedicated measures to support cities in building up technical capacity.

Nevertheless, from the perspective of Task 2.4 we have included all those standards, since they are the ones that require attention from CIMEC's special perspective.

Scanning through the list we find certain recurring patterns that allow to group standards according to the way that cities need to deal with them.

4.1 Standards already in use in Urban ITS that need to be adapted.

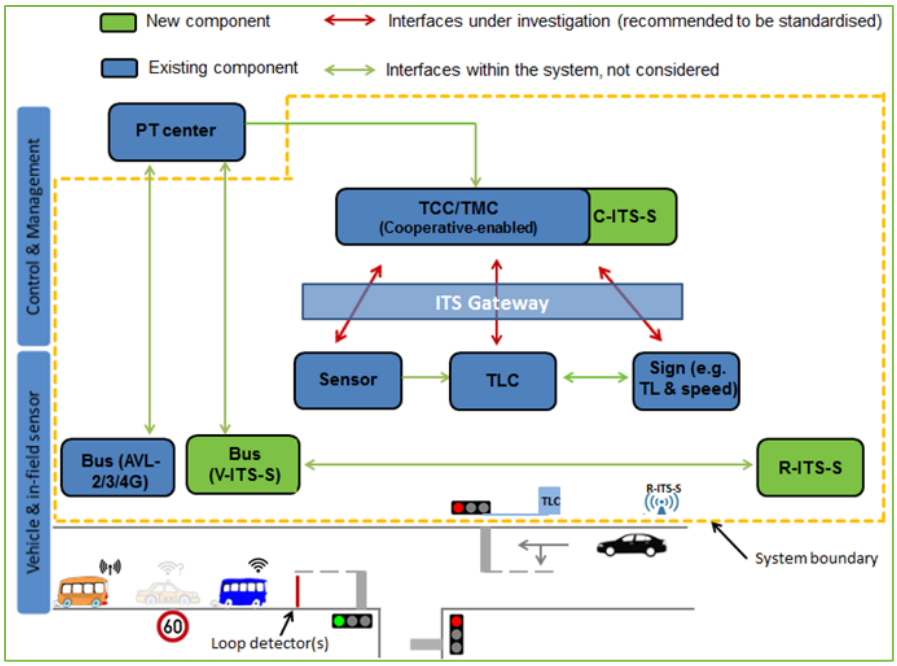
This category includes especially the regional standards that have been developed more or less directly inside the urban ITS domain. Some of them are established already for quite a while and at the time their development started the term ITS may actually not have been established in the urban domain, so their terminology may not contain ITS but rather speak of telematics or traffic control. Nevertheless, these standards are at the heart of today's ITS business processes of urban road operators. Such standards typically concern interoperability between different components in a traffic management and control environment. The list includes IVERA, OCIT and UTMC as typical examples of national / regional community standards.

In essence – as the analysis of the bus priority example in section 3 has shown – the need for adaption results from the fact that either new components with different, C-ITS enabled functionality must be

directly supported by these standards in order to allow deployment of C-ITS functionality, or at least established components need to handle and exchange different information in order to do so. The interesting observation here is that this requirement comes at a time where many experts were thinking about a new generation of these standards anyway, since their underlying technical background has become deprecated in the ICT domain. This correlation of two requirements for adaptation coming at the same time seems to provide some potential for synergy.

At the same time, we see this in the light of both input streams we have processed – from the C-ITS standardisation framework as well as from the Urban ITS standardisation initiative – clearly pointing towards European level standardisation at the accredited ESOs, mainly at CEN (CEN TC278 WG16 or WG17). PT1701 for example made a recommendation for a *"A control interface standard to link roadside devices such as signal controllers to an in station system, to support multi-vendor integration"*. This would directly have to build upon current regional standards as mentioned above (IVERA, OCIT, UTMC, etc.). Hence, we see a potential trend to take very important standards from regional, industry-led consortia to CEN working groups, which would need mediation and consent between the different SDOs and stakeholder groups involved. This recommendation got supported during the standardisation workshop with the emphasis on including migration path by design, e.g. technical options on how to migrate from existing to future system. The figure 3 below maps this interface in the example use case.

Figure 3: Illustration of the recommended interface in the bus priority use case



Recommendation: A suitable, independent actor (e.g. the European Commission or maybe ERTICO) should establish a platform for industry-led national or regional SDOs in charge of existing urban standards that are currently planned to be addressed in the future on European level by an ESO to address issues like mutual awareness, backwards compatibility, migration paths, common cross-referencing, parallel evolution, etc. In response to the aforementioned recommendation, it is vital to keep cities informed about any conclusions drawn and explain the future relationship between continued action of national / regional SDOs and parallel activities on ESO level. The probability of success of such work items / groups in ESOs would highly benefit from the participation of the stakeholders in the existing standardisation activities by sending experts to the new ESO work items / groups, sharing experience and capacity building.

4.2 C-ITS standards that might limit functionality in urban use cases

There is a very large set of standards for which very mature drafts or even first European / international standards are already available or currently under development, where an urban road operator might prefer not to deal with in detail. Such standards are usually specifying technical concepts of a C-ITS system on a detailed level (e.g. communication protocol aspects or internal system facilities). The road operator usually expects these standards to be in place and assumes that 'the market' (typically suppliers) will provide the technical expertise to develop as part of a pre-competition cooperation in order to develop markets.

The problem is, that the specification details of such standards often limit externally visible system functionality, which means that conformant systems might potentially fail to match functional requirements of the operator, e.g. data structures in the DENM standard were found by early implementers not to be sufficient to capture the actual situation in the infrastructure. This can only be solved by a direct link between the functional requirements and the technical design process. Two options seem possible:

a) Wherever such standards are still under development or where they are under revisions, road operators should provide functional requirements for the application/service context of systems conformant to this standard. One way that has proven to work fairly well for this process is to have users describe *Use Cases,* that can then be matched to technical features of the respective standards under development.
b) Where such standards already exist or are close to being finalised and robust drafts already exist, road operators should be actively included in the respective review processes that exist at various stages in the standards production process to indicate limitations that would not match their requirements.

Again, both approaches are not easy to organise. Urban road operators throughout Europe are a diverse community, they are not organised in any hierarchical umbrella organisation that could be used as a single proxy on such a level of technical detail and they are typically neither used to contributing directly to international standardisation, nor do they see this as part of their remit. Nevertheless, the experience with failing to implement this contribution has already become quite apparent in the first attempts to roll-out C-ITS functions based on V2I communications on motorways. Data structures in such ITS standards (e.g. DENM) where found by early implementers to fail to comply with the actual situation in the infrastructure. Since the controlled motorway scenario is much easier to handle than the complex urban situation, we can expect that first operational urban roll-out might face even more severe problems.

It is therefore of utmost importance to find ways to incentivise road operators to contribute to C-ITS standardisation in the ways described above. Suppliers have so far taken up this task, but since requirements of users (i.e. road operators) and their suppliers are not necessarily congruent in all cases, this is not likely to create the standards needed for swift roll-out of C-ITS in urban environments.

Standards falling in this category are for example the relevant facility layer service standards specifying message sets (CAM, DENM, SPaT, MAP, IVI…), but also other facility layer and station architecture standards, e.g. on local dynamic maps. The same holds for all overall system architecture standards that would of course need contribution from operators that would want to operate such C-ITS infrastructure themselves in the future, and also for technical standards addressing system security and privacy aspects.

One point of view – indicated in the in the WP1 surveys and workshops and confirmed in the standardisation workshop's discussion – is that the main key problem of engaging urban road operators is the lack of personal resources or financial and technical capacity. The participation of urban road operators will contribute to the overall aim of enabling C-ITS functionalities within the urban (C-)ITS-architecture that is:

a) Compliant to regional used standards.
b) Interoperable with existing systems.
c) Sufficiently open to be relevant for most cities.

Another point of view argued that it is actually difficult to deliver the message – when developing European standards – across to the level of public road authority's granularity. With this regard, addressing the right person within public road authority at the level where decision can be made is very helpful to tackle this issue.

Recommendation: Consider all possible means to enable urban road operators to build-up technical as well as financial capacity to contribute to required standardisation work in the way described above.

Financial capacity could be stimulated by funding / co-funding schemes particularly addressing such standardisation activities. Technical capacity could be created by dedicated actions to develop guidelines, online educational services, but also by raising awareness about which standards require road operator contribution and how this contribution could be established.

4.3 Standards that have impact on urban road operators' business processes

Some standards seem rather or even entirely technical on the first glance, describing technical features of system and components. Road operators will normally see this as the supplier domain and don't see a need for getting involved. At a second – deeper – look, it becomes apparent that deploying systems conformant to such standards may have significant impact on urban road operators' business processes. The well-known example is the specification of the MAP message in ISO/TS 19091.

The specified data structures themselves are detailed and complex and appear to be addressing mainly system developers. But of course the data structures need to be filled in operation by the road operators, and the C-ITS specifications don't specify how and where the road operators should generate this information and which processes, skills, tools need to be available to maintain the information and keep it up-to-date in case of change. Since the assessment of the actual impact those requirements on business processes have on the road operators' organisation is difficult for outsiders, urban road operators need to be involved in the standards development process in these cases.

Of course the same holds for all standard addressing organisational issues directly, e.g. roles & responsibilities.

Recommendation: It is vital to agree on the existing and relevant list of standards falling into this category and stimulate urban road operator contribution to the respective standardisation activities. Instruments to raise awareness and stimulate contribution would be needed.

4.4 Standards supporting procurement

Procurement is probably the most prominent place where needs for standards are phrased. The availability of a suitable set of robust standards is actually seen as a pre-requisite for procurement. And the ability to procure systems and/or services is of course a prerequisite for real world deployment beyond field trial / pilot settings. A lot has already been said about the role of standards containing specifications in phrasing technical system specification in procurement. But the procurement process also requires further support, especially regarding component and system testing and finally acceptance tests.

There is still much concern regarding the split between system capabilities inherited from the "C-ITS market" (e.g. interoperability statements from plug-tests) and those capabilities for which the infrastructure operators have to specify appropriate tests themselves. This uncertainty also extends to require testing environments, e.g. do road operators need test labs with full TTCN3 (Testing and Test Control Notation Version 3) testing capabilities? Ideally, a common framework would be developed for the whole C-ITS domain where the actions required from road operators procuring particular ITS station types are clearly defined and supporting facilities to build-up technical capacities are in place.

Recommendation: Launch a dedicated activity to describe required testing specification for C-ITS services and equipment for urban road operators. Extend described supporting actions to build-up technical capacity (and maybe also financial capacity) to test standards and testing as a whole. One concrete, specific recommendation for EC – indicated in the standardisation workshop's discussion – is to accelerate the development process of conformance test for infrastructure-based messages, e.g. SPaT/MAP.

4.5 Other suggested recommendations

Due to the lack of technical capacity, cities would not like to be involved in a detail of technical functionalities, but buying a cooperative component for the intended service. Therefore, it is ideal for them to write their conformance statement for tendering with respect to cooperative services of interest. The following set of requirements identified for public road authorities:

a) All equipment should be able to communicate, via compatible 3G, 4G, ITS G5, etc.
b) Mean of communication should be technology-agnostic and interoperable,
c) Remote update of application parameters protocol at any time should be included. In other words, protocol should be maintained remotely
d) Certified level of IT-security to prevent misuse of the systems

During the discussion of the standardisation workshop, other standardisation activities missed by some of the participants – including attended cities – were:

a) Awareness for necessary tools and methods to accelerate the expected changes of business process, so that new tasks ca n ne completed
b) Common standardised security mechanism
c) Trust authority for C-ITS security

The last three recommendations are addressed by of C-ITS platform and ESO, and it is still an ongoing work.

REFERENCES

C-ITS-Platform, E. (2016). *Final Report.*

Codecs. (2016). *Workshop Perspectives in functional roadmapping - Summary.*

EC. (2010). Risk management in procurement of innovation .

EC. (2011). *WHITE PAPER: Roadmap to a Single European Transport Area – Towards a competitive and resource.*

EC. (2013). *Guide for the procurement of standards-based ICT – Elements of Good Practice.*

ETSI/CEN. (2013). *Final joint CEN/ETSI-Progress Report to the European Commission.*

POLIS. (n.d.). Private communication.

Polis. (2014). *European Cities's Perspective Junction.*

PT1701, C. T. (2016). *Standards and actions necessary to enable urban infrastrcture coordination to support Urban-ITS.*

TEAM. (2015). *Report on standard compliance of the TEAM.*

ADDITIONAL BIBLIOGRAPHY

(EC, Risk management in procurement of innovation , 2010)

APPENDIX 1: ABBREVIATIONS AND REFERENCE LIST

Term	Meaning
ADR	Formally, the European Agreement concerning the international Carriage of Dangerous Goods by Road (ADR) is a 1957 United Nations treaty that governs transnational transport of hazardous materials
AVL	Automated Vehicle Position
CAM	Cooperative Awareness Message
C-ITS-S	Cooperative-ITS-station
DENM	Decentralised Environmental Notification Message
ESO	European Standards Organisation
ICT	Information and Communication Technology
ITS	Intelligent Transport System
LTE	Long Term Evolution
MAP	ISO standard of topological definition of road network (TS ISO/TS 17931)
NOx	Generic term for the mono-nitrogen oxides NO and NO_2 (nitric oxide and nitrogen dioxide)
OCIT	Open Communication Interface for Road Traffic Control Systems
P-ITS-S	Personal ITS-station
PT	Public Transport
R-ITS-S	Roadside ITS-station
SDO	Standards Development Organisation
SPaT	Signal Phase and timing protocol
TCC	Traffic Control Centre
TMC	Traffic Management Centre
TTCN	Testing and Test Control Notation
UTMC	Urban Traffic Management Control
V-ITS-S	Vehicle ITS station

Author	Reference
European Commission	C-ITS-platform-final-report-january-2016
	WG7 - ANNEX 1 - C-ITS_Standards_Deployment_Europe_v2_December_2015
CEN	PT 1701-0300 Urban ITS Requirements Analysis 160117 v215_00-00-01_2016
	N196_C-ITS Release 1_CEN-ISO standards list_v2
ISO	ISO-TC204 WG18_N0313_WG18_SWG2_FDReport_GapOverlap_analysis_2016
	ISO/TS 17427:2014 "Cooperative systems -- Roles and responsibilities in the context of cooperative ITS based on architecture(s) for cooperative systems"
ETSI/CEN	Final joint CEN/ETSI-Progress Report to the European Commission on Mandate M/453
AG	Standards Towards V2V/I2V/V2I joint deployment
	Functional description of Day1 use cases (IVI, PVD, RW, SPAT)
UR:BAN (project)	Deployment guide of cooperative systems from public perspective - March 2016
COMeSafety2 (project)	D5.4 Report on the framework for the deployment of cooperative ITS (2013)
TEAM	WP23-20130630v1.4-DL-D2.3.1 EMPOWER requirements and initial specifications
	WP65-20150910v1.0-DL-Deliverable_D6.5.1 SUPPORT report on standard compliance

APPENDIX 2: DEFINITIONS

Term	Definition
Guideline	A statement by which to determine a course of action, may refer to other documents
Workflow	Sequence of processes through which a piece of work passes from interaction to completion
Public road authority	City representative (either public or private body) who is in charge of managing and controlling road traffic in cities
Interoperability	Specification of interfaces allowing equipment and software from different vendors to work together as intended
Compatibility	The capacity of two systems/products to work together without having to be altered. Systems or products can be of the same type, hardware of software. There are two types; forward and backward compatible
Portability	Related to software being able to run on different platforms
Compliance/conformance	Is a certification from recognized body that a product, component or service meets the requirements of the specified standard, requirements of legislations, or even accepted practice etc.

APPENDIX 3: BUS PRIORITISATION AT A SIGNALISED INTERSECTION

Description of bus prioritisation at a signalised intersection

One important use case has been stated by the city workshops in the framework of WP 1 is bus prioritisation at a signalized intersection. In accordance to this and the previous interest of this use case within the activities of POLIS (Polis, 2014), focus on this use case is considered as an example for analysis of main aspects of standardisation that need particular attention when considering the urban C-ITS domain.

Bus prioritisation at a signalised intersection (called also Public Transport Signal Priority) is a use case of adapted signal control in which the normal traffic signal operation is adjusted in real-time in a way that buses with or without a dedicated lane are prioritized at signalized intersections when approaching.

Of course, this is a well established urban use case, and is in operation already for a long time using unidirectional, traditional communication technologies or with the support of conventional detection systems as a trigger. However, cooperative technologies may impact positively the efficiency of public transport operation and may replace legacy detection infrastructures that are expensive to maintain, i.e. 50% of loop detectors are not working in Paris (source: POLIS). The use case is simply used to highlight the impact and relationship between different standards in one concrete example.

Possible system architecture and associates standardisation potential

In order to elicit the functional requirements for standards supporting this use case, we need to consider an example for a concrete system architecture for identifying interfaces and processes that may require standards for interoperability and meeting the expected functional requirements. It is important to note that the architecture depicted in figure 4 is only one possible example of how to implement this use case, which we use here to highlight the issues found regarding standardisation of urban C-ITS.

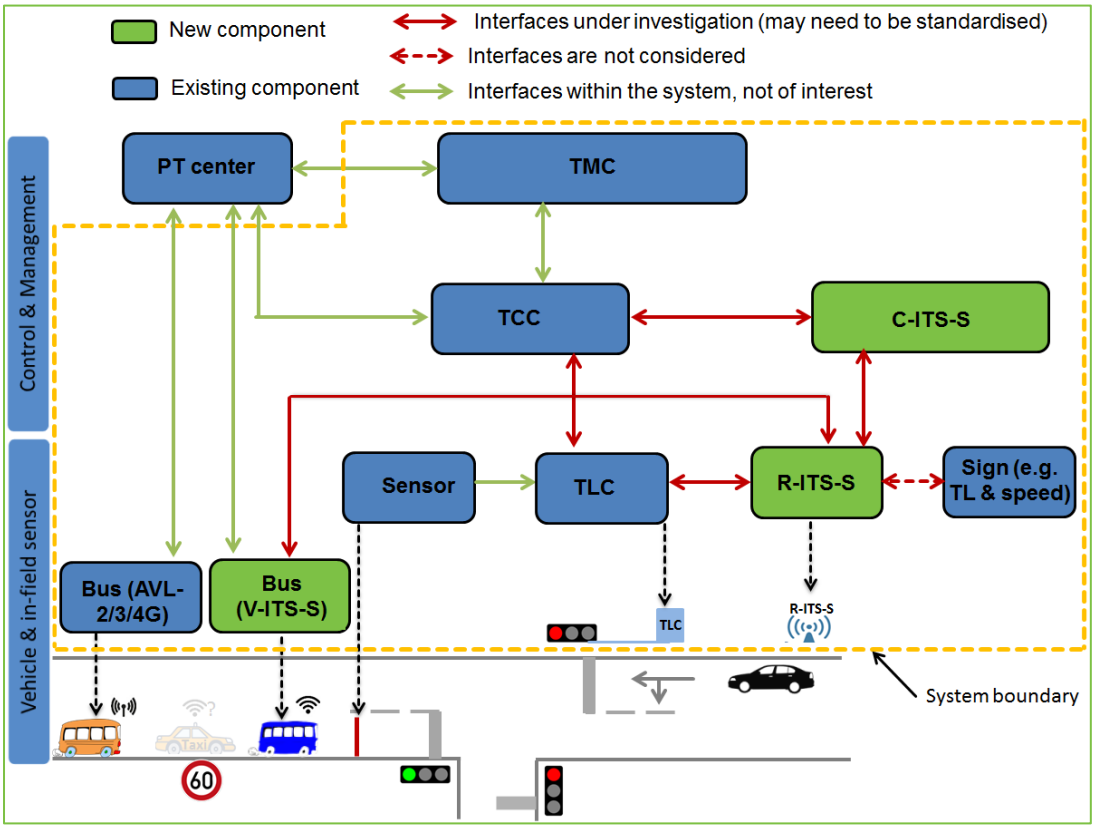
The existing components of this possible system are TCC (Traffic Control Centre), PT Centre (Public Transport Centre), Sensors or loop detectors, Bus with AVL (automated vehicle location)/3G or 4G, R-ITS-S, C-ITS-S, TLC (Traffic Light Controller) and bus with OBU (V-ITS-S).

1. A bus with a cooperative technology such as ETIS ITS G5 or Cellular system sends its status via an initial message to a R-ITS-S. The R-ITS-S shall monitor traffic and environmental information by processing the validated and legitimate messages from buses and send the needed parameters to the TLC, conventional sensors may also be connected directly to TLC.
2. When approaching a signalised intersection, the bus shall be able to send a request of signal prioritisation to the R-ITS-S.

3. The TLC receives the information from the R-ITS-S, if R-ITS-S is not embedded in the TLC.
4. The TCC is keeping TLC updated with any change of traffic control strategy and with the available paths through the intersection. The C-ITS-S is supporting this process by forwarding relevant information from the R-ITS-S to TCC.
5. The TLC post-processes the received parameters and then either:
   - **Option A**: The TLC may give a green or extend the green time of the signal
   - **Option B**: The TLC may forward the request to TCC and the prioritisation is approved and given back to the TLC

In according to the description of the use case, the proposed system has the following architecture:

Figure 4: Building blocks of the use case



Error! Reference source not found. above illustrates the components of the described system for bus prioritisation use case that are classified into two general levels:

- vehicle and in-field sensor components (outstation) and
- control and management (in-station)

From another point of view, the system comprises new cooperative components, which enable cooperative services within the existing legacy system, such as R-ITS-S. These have to be connected to existing components such as TLC, which are already in operation. Regarding standardisation requirements, the focus is on the upper layer interfaces between new and existing components; thus, the key current standards relevant to this use case are:

- OCIT-O(3.0), OCIT-C(2.0) by OCIT/ODG
- TLC-FI, IVERA-APP and RIS by BBV Program
- And guidelines such as UR:BAN and RTIGT031

APPENDIX 4: STANDARDISATION WORKSHOP'S PROTOCOL

Invitation

A panel discussion, workshop style, will be held within the scope of the H2020 CIMEC project under the working title ''C-ITS standardization requirements for the urban environment''. This will on the one hand present and discuss the outcome of the deliverable ''Evaluation of city relevant ITS/C-ITS standards with a case study'', and on the other, discuss just how relevant ITS/C-ITS standards can meet cities' needs to overcome some barriers to integrating C-ITS into legacy systems in the best possible way.

The outcome will be summarized as a input for developing a realistic roadmap for the deployment of C-ITS in the city environment (WP 3), the basis for second standardisation workshop. This will aim at identifying new, potentially ''missing'' standards as a contribution to a future EC-mandate, possibly through the new WG17 of CEN278 and the current activities of release 2 of C-ITS standard by all SDOs as examples.

The workshop is open for everyone involved in urban ITS standardization as expert or a representative of standardization originations/associations (ISO, CEN, ETSI, C2C CC, etc.) and ITS/C-ITS suppliers.

Topic of the workshop

C-ITS standardization requirements for the urban environment

Venue

Rue du Trône 98, Brussels

Date and time

12th September 2016, 11:00 – 15:30

Please contact Mr. Osama Al-Gazali (osama.al-gazali@albrechtconsult.com) as soon as possible to let him know whether you will be able to attend this workshop!

In order to facilitate your participation, a dedicated (limited) budget is available to cover T&A expenses for selected participants. We will be contacting you again regarding the workshop agenda. Looking forward to seeing you in Brussels.

Agenda

Time slot	Activity	Moderator/presenter
11:00 - 11:15	Welcome	Osama Al-Gazali
11:15 - 12:00	Presentations: Regional perspectives on standardisation 1. UR:BAN: R&D-German project on cooperative ITS services, funded by ministry of economics and energy 2. Use Case for a UK Local Authority: Improving Signals using C-ITS	Bernd Noll Gav Jackman
12:00 - 13:00	Presentation (two parts): ➢ Assessment of relevant ITS/C-ITS standards ➢ C-ITS potential/expected impact on urban mobility	Osama Al-Gazali
13:00 - 13:45	Open discussion (Part I): How to ensure that the list of relevant ITS/C-ITS standards and current standardisation activities meet cities requirements?	Josef Kaltwasser
13:45 - 14:30	Lunch & coffee	
14:30 - 15:15	Panel discussion (Part II): Which additional standards (missing standards) may be needed to exploit the full C-ITS potential/expected impact on urban mobility?	Josef Kaltwasser
15:15 - 15:30	Summary and closure	Osama Al-Gazali

Participants

Bahar Namaki Arghi	City of Copenhagen
Bernd Noll	City of Kassel
Suzanne Hoadley	Polis
Giacomo Lozzi	Polis
Gav Jackman	Telent
Stephanie Leonard	DG-Move
Solveig Meland	SINTEF
Hans-Joachim Fischer	ESF GmbH
Mark Cartwright	Centaur Consulting Ltd
Bob Williams	Consultant of CSI (UK) Ltd
Osama Al-Gazali	AlbrechtConsult GmbH
Josef Kaltwasser	AlbrechtConsult GmbH

APPENDIX 5: CIMEC-CODECS CITY POOL WORKSHOP

Summary

AC presented the outcomes of the deliverable 2.4 at the City pool workshop (14.11.2016), including the standardisation workshop's discussion. The main message simply was the urgent importance of taking into account representative needs / requirements cities, in the current and future urban-ITS / C-ITS standardisation activities in order to eventually be able procure product(s) or solution(s) that is(are):

- Usable and useful: fits its purpose and provide better performance of the overall system of ITS
- Cost-effective: firstly, it does not imply significant efforts to be integrated into the legacy system and to be maintained. Secondly, it enables competitive procurement through interoperable interface.
- Trusted: by securing the flow of data along the value chain taking into consideration privacy issues.

The audience – who are cities and regions representing the majority[5] of overall participants of the workshop – supported the presented, suggested recommendations all. They even showed interest in taking part in realising these recommendations.

This can be in form of delivering their own requirements which should directly impact the current activities of the ESO's development process. The C2C-CC see this important as it is a high-level requirements and this could be an issue of discussion, when the voice of cities will heard.

The EC responded / is responding, through the urban WG of the C-ITS-S platform, and financing the standardisation activities such as the CEN/TC278: urban ITS WG 17 and the C-ITS WG 16. These efforts are very important, however the size and effective of representative may be limited and need other measures to open up the discussion in form of platform, if not giving incentives (see recommendation 1 in 4.1)

[5] More than 50 people attended the workshop of which one half were made up of representatives of local government / cities.

APPENDIX 6: ADDITIONAL STANDARDS REQUIRED BY THE CIMEC USE CASES

#	SDOs	Document reference	Title	Applicability to CIMEC use cases[6]
1	EN	12896	Transmodel v6- Part 1: Common Concepts (Location Model, Projection Model)	UC 1
2	EN/ISO	14819-3	Traffic and travel information (TTI) TTI messages via traffic message coding - part 3 location referencing for Radio Data System - Traffic Message Channel (RDS-TMC) using ALERT C	UC 1
3	ISO	17572-3	Intelligent transport systems (ITS) -- Location referencing for geographic databases – Parts 1,2 and 3	UC 1
4	ISO	TS 19147:2015	Geographic information -- Transfer Nodes	UC 1
5	ISO	TS 102 894-2 V1.1.1	Geographic information	UC 1
6	ISO	14825	Intelligent transport systems -- Geographic Data Files (GDF) -- GDF5.0	UC 1
7	ISO	14813-1	Intelligent transport systems — Reference model architecture(s) for the ITS sector — Part 1: ITS service domains, service groups and services.	UC 1 and UC 10
8	ISO	14817	Intelligent transport systems — ITS central data dictionaries — Part 1: Requirements for ITS data definitions.	UC 1 and UC 10
9	ISO	15784	Data exchange involving roadside modules ISO communication	UC 1 and UC 10
10	ISO	26683-1	Intelligent transport systems — Freight land conveyance content identification and communication (FLC-CIC) — Part 1: Context, architecture and referenced standards	UC 3
11	ISO	16787	Intelligent Transport Systems — Assisted Parking Systems (APS) — Performance Requirements and Test Procedures	UC 10
12	ISO	26683-2	Intelligent transport systems — Freight land conveyance content identification and communication (FLC-CIC) — Part 2: Application interface profiles	UC 3
13	ISO	21217	and associated C-ITS communications standards	UC 2, UC 3, UC 4 and UC 5
14	ISO	14001:2004	Environmental management systems -- Requirements with guidance for use	UC 3
15	CEN	EN 12896	Public Transport Reference Data Model Part 1 to 3 (Transmodel v6). EN12896 Transmodel v5.1.	UC 1 and UC 10
16	CEN	EN 16614-1	Network and Timetable Exchange — Part 1: Network Topology	UC 1 and UC 10
17	CEN	EN 15531	Part 1 to 4 Service interface for real-time information (SIRI): real-time public transport data.	UC 1 and UC 10
18	CEN	EN 16258	Methodology for calculation and declaration of energy consumption and GHG emissions of transport services (freight and passengers)	UC 3
19	CEN	TS 15531	Part 5 Service interface for real-time information (SIRI-FM Facility Management).	UC 1 and UC 10

[6] UC is an abbreviation to use case