Harmonising European ITS Services

Traveller Information Services

FORECAST AND REAL TIME EVENT INFORMATION

Deployment Guideline

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The Deployment Guidelines have been developed in EasyWay, EIP and EIP+
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Preface (2016)

After the EasyWay project ended in 2012, the Deployment Guidelines have been updated by the EIP / EIP+ projects. They focussed on updating Best Practice and did neither have the capacity nor the intention for a full revision of the text, since especially the Member State adoption of the guidelines' requirements form a huge asset of European harmonisation. In the light of recent European Delegated Regulations, the EU EIP platform will now consider a full revision of the format and the content of the whole set of Deployment Guidelines.

Preamble (2012)

EasyWay is a cooperation of road authorities and road operators from 27 European countries that have teamed up to unlock the benefits of cooperation and harmonisation in the deployment of Intelligent Transport Systems (ITS) on Europe's major road network. ITS as a technology is a known contributor to sustainable mobility in terms of improved safety, efficiency and reduced environmental impact. Nevertheless, fragmented deployment on a national level will fail to deliver seamless European services and will not contribute to a coherent European Transport network. The European Member States have consequently launched the EasyWay project together with the European Commission as a platform to harmonise their ITS deployments.

This document has been drafted by EasyWay as part of the set of documents containing the 2012 version of the EasyWay Deployment Guidelines (DG 2012). These guidelines have been developed by EasyWay experts and practitioners. They have undergone a thorough review by international domain experts in an intense peer review exercise and they have been validated by the participating Member State Partners of EasyWay in an extensive formal Member State consultation process, which finally led to their adoption as basis for all deployment activities in future EasyWay phases.

EasyWay as a project is not a standardisation body, nor does it have any power to legally constrain the Member State in their national deployment activities. It is therefore crucial to understand that these documents are neither technical standards, nor are they specifications as they would be required for such cases, e.g. as currently developed by the European Commission as their part of the implementation of the ITS Directive 2010/40/EU. But since a certain level of strictness in compliance is required to achieve the intended goal of the EasyWay Deployment Guidelines – harmonisation and interoperability in Europe – the guideline documents are written in a way that clearly defines criteria that deployments have to fulfil in order to claim overall compliance with the guideline.

Although not legally binding in any sense, compliance may be required for the eligibility of deployments in future ITS road projects co-funded by the European Commission. Deviation from compliance requirements may nevertheless be unavoidable in some cases and well justified. It is therefore expected that compliance statements may contain an explanation that justifies deviation in such cases. This is known as the "comply or explain" principle.

Although not standards themselves, the EasyWay DG2012 Deployment Guidelines in some cases do mention – and sometimes require – the use of such standards. This is the case in particular regarding the use of the CEN/TS 16157 series of technical specifications for data exchange ("DATEX II"). Although standardised data exchange interfaces are a powerful tool towards harmonised services in Europe, it must be understood that real world deployments have to fit into existing – and sometimes extensive – infrastructures and investment in these infrastructures must be protected. It is therefore important to note that the use of DATEX II mentioned below as a MUST is referred to implementation of "new" data exchange systems and not the utilisation of the existing ones, unless these latter affect harmonisation of deployments or interoperability of services.

Service at a glance

SERVICE DEFINITION

"Forecast and Real Time Event Information Services" are defined as the provision of information about both expected and unexpected events to road users on identified road segments of the TEN-T network and interfaces. This predictive or real-time information could be provided on-trip and pre-trip using different information channels, accessible by the road user via different end-user devices. The service may comprise common information as well as individual (personalised, on-demand) information.

"Events" are defined as - expected or unexpected – abnormal situations which may lead to adverse effects on the road as regards to traffic safety, efficiency and environmental effects.

SERVICE OBJECTIVE

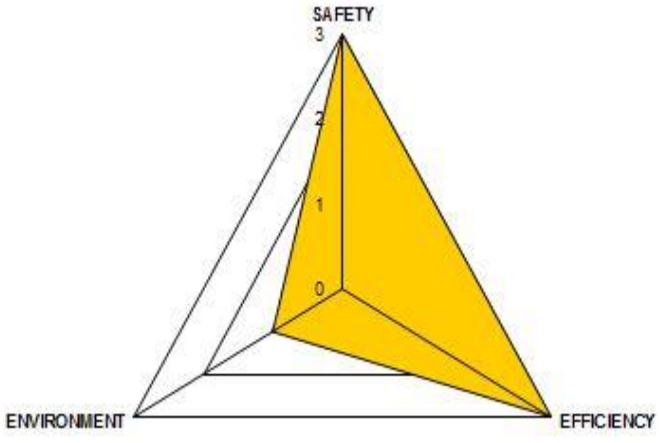
The main objective of providing forecast and real time event information and warnings to the road user is improving the safety and the efficiency of the network.

Expected and unexpected events can develop into a traffic bottleneck, due to abrupt reactions of uninformed drivers. However, if those drivers know the upcoming traffic situation in advance they would be prepared and could pro-actively adapt their speed and following distance, thus preserving smooth, stable and safe traffic flow.

Forecast and real time event information services allow traffic information to be factored into both pre- and on-trip journey planning. This can alter the departure times, assist the driver to take more effective routing decisions, where appropriate, select another means of transport or even alter the decision to travel.

The provision of information to drivers enhances the travelling experience even if the information does not directly impact on network efficiency or safety. Better-informed drivers tend to be calmer and hence more concentrated. Other impacts are the increased mode share of public transport and reduced air pollution.

SERVICE BENEFIT RADAR



EUROPEAN DIMENSION

Forecast and real time event information influences the route chosen by the road users travelling both short and long distance and inter- and intra- national trips throughout Europe. Therefore, service providers should try to provide the information either in different languages (if possible) or preferably in a language independent format (by using pictograms, symbols, etc.).

Existing deployments and road user information requirements across Europe are currently very different. So long as differences exist in national policies and investment strategies guide future deployment, stipulating minimum levels of service to be achieved is not practical. However, by defining the Levels of Service and criteria most important to the information service, future deployments can be made in line with this progression towards greater European harmonisation of service levels. Recommendations are given to provide this service in a more European context.

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List of abbreviations

ANPR	automatic number plate recognition
DG	Deployment Guideline
EU	European Union
EW	EasyWay
FCD	Floating Car Data
ITS	Intelligent Transport Systems
LoS	Level of Service
OE	Operating Environment
MoU	Memorandum of understanding
RFC 2119	Request For Comments 2119
RDS-TMC	Radio Data System Traffic Message Channel
TEN-T	Trans-European Transport Network
TERN	Trans European Road Network
TIS	Traveller Information Services
TMP	Traffic Management Plan
TMS	Traffic Management Services
TPEG	Transport Protocol Experts Group (standard)
TVCC	Television Control Centre
UML	Unified Modelling Language
VMS	Variable Message Sign
FR<#>	Functional requirement <number>
OR<#>	Organisational requirement <number>
TR<#>	Technical requirement <number>
CL&FR<#>	Look and feel requirement <number>
LoSR<#>	Level of service requirement<number>

1 Introduction

1.1 The concept of the EasyWay Deployment Guidelines

1.1.1 Preliminary note

This document is one of a set of documents for the EasyWay project, a project for Europe-wide ITS deployment on main TERN corridors undertaken by national road authorities and operators with associated partners including the automotive industry, telecom operators and public transport stakeholders. It sets clear targets, identifies the set of necessary European ITS services to deploy (Traveller Information, Traffic Management and Freight and Logistic Services) and is an efficient platform that allows the European mobility stakeholders to achieve a coordinated and combined deployment of these pan-European services.

EasyWay started in 2007 and has since established a huge body of knowledge and a consensus for the harmonised deployment of these ITS services. This knowledge has been captured in documents providing guidance on service deployment - the EasyWay Deployment Guidelines.

The first iteration of the Deployment Guidelines mainly captured best practice. This strongly supported service deployment within EasyWay by:

- making EasyWay partners in deployment aware of experiences made in other European deployment programmes.
- helping to avoid making errors others had already made
- reducing risk and facilitating efficient deployment by highlighting important and critical issues to consider

Meanwhile, this best practice has already successfully contributed to ITS deployments across Europe. It is now possible to take the logical next step and actually start recommending those elements of service deployment that have proven their contribution to both the success of the local deployment, as well as the European added value of harmonised deployment for seamless and interoperable services.

1.1.2 Applying Deployment Guidelines – the “comply or explain” principle

The step from descriptive best practice towards clear recommendations is reflected in the document structure used for this generation of the Deployment Guidelines. Apart from introduction and the annexes that cover specific additional material, the Deployment Guidelines consist of two main sections:

Part A – this part covers the recommendations and requirements that are proven to contribute to successful deployment and have been agreed by the EasyWay partners as elements that should be part of all deployments of this particular service within the scope of EasyWay. Thus, the content of this section is prescriptive by nature. EasyWay partners are expected to ensure that their deployments are compliant with the specifications in this section. Wherever concrete circumstances in a project do not allow these recommendations to be followed fully, EasyWay partners are expected to provide a substantial explanation for the need for this deviation. This concept is known as the “comply or explain” principle.

Part B – this part offers an opportunity to provide more valuable but less prescriptive information. Supplementary information may be contained including – but not limited to – regional/national examples of deployment and business model aspects like stakeholder involvement or cost/benefit analysis results.

1.1.3 Use of Language in Part A

It is essential for every prescriptive document to provide specifications in a well-defined and unambiguous language. There are various definitions that clarify the use of particular words (such as those listed below) within their prescriptive texts.

For the purpose of the EasyWay Deployment Guidelines, the well-established provisions of the RFC 2119 (http://www.ietf.org/rfc/rfc2119.txt, see (1)) are used, which is used to specify the basic Internet standards:

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119.

An overview of the keywords, their meaning and the possible answers in the context of part A provides the following table. In general the keywords in brackets are possible, but their use is not recommended in order to avoid confusion which may arise as a consequence of different common linguistic usage of the terms in the different EU member states.

Requirement wording	Meaning in RFC 2119	Meaning in EasyWay	Possible checklist answers
MUST (REQUIRED, SHALL)	the definition is an absolute requirement	there may exist insurmountable reasons to not fulfill (e.g. legal regulations…)	**fulfilled: yes** **or** **Fulfilled: no - explanation of insurmountable reasons**
MUST NOT (SHALL NOT)	the definition is an absolute prohibition		
SHOULD (RECOMMENDED)	there may exist valid reasons in particular circumstances to ignore a particular item, but the full implications must be understood and carefully weighed before choosing a different course.	The Definition is very close to a "MUST", "MUST NOT" Meaning in EasyWay conform to RFC 2119	**fulfilled: yes** **or** **Fulfilled: no - with explanation**
SHOULD NOT (NOT RECOMMENDED)	there may exist valid reasons in particular circumstances when the particular behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label		
MAY (OPTIONAL)	The item is truly optional. One deployment may choose to include the item because of particular local circumstances or because it is felt to deliver a special added value	Meaning in EasyWay conform to RFC 2119	**fulfilled: yes - with explanation** **or** **Fulfilled: no**

Table 1: Part A - requirement wording

Note: the capitalisation of these keywords that is frequently used in Internet standards is not recommended for EasyWay Deployment Guidelines.

The use of this 'requirements language' allows the direct transfer of the requirements stated in part A to a compliance checklist.

The following paragraph gives an example for a functional requirement:

Functional requirement:

- **FR2:** Data and information collected by both automatically and non-technical sources **must** be based upon both a consistent geographic reference model and a time validity model, which both **must** be part of data description.

Beneath "Requirement" a new semantic element "Advice" is proposed for part A, which has not the character of a hard requirement but of a "recommendation" and hence must not be listed in the compliance checklist. "Advice" is not immediately related to the three pillars of ITS-service harmonization (Interoperability, Common look & feel, Quality criteria) but to "inner features" of an ITS-service. Nevertheless such an element delivers a European added value and hence should be addressed by the deployment guidelines.

The notation for using the advice element in the text is as follows:

Organisational advice:

- Clear definitions of organisational aspects are a crucial precondition for the successful implementation of a "Forecast and real-time event information service" and should be documented and accepted of all involved parties/partners in form of a Common partner arrangement/MoU - Memorandum of understanding, which establishes the details of co-operation.

1.2 ITS-Service Profile

1.2.1 ITS-Service Strategy

1.2.1.1 General Service Description

A general overarching description of TIS-services is outlined in the "Traveller Information Services REFERENCE DOCUMENT, TIS Deployment Guideline Annex, Version 02-00-00":

- Executive summary and
- Chapter 2.1" General Service Description"

Specifically “Forecast and Real Time Event Information Services” means the provision of information about both expected and unexpected events to road users on identified road segments of the TEN-T network and interfaces.

“Events” are defined as - expected or unexpected – abnormal situations, which may lead to adverse effects on the road as regards to traffic safety, efficiency and the environment.

There are two categories of events:

- expected events, e.g.:
  - Road works, traffic jams, closures, parking rest info, strikes, protest rallies, major events (sports games, concerts, festivals...), and frequent overloading (commuter and holiday travel), parking rest area information, road/bridge/tunnel/lane/border closures...
- unexpected events, e.g.:
  - incidents, accidents, road/bridge/tunnel/lane closures, objects on the road (objects, animals, people), ghost-drivers, parking and rest area information, sudden end of slow or stationary traffic, reduced vision, slippery surface (aquaplaning, ice, oil…), sudden severe adverse weather, long delays at borders...

As part of a global information strategy, forecast and real-time event information services shall provide:

- Pre-trip warnings to drivers about upcoming expected events and known unexpected events
- On-trip warnings to drivers about expected and unexpected events

1.2.1.2 What is the Vision?

The main objective of providing forecast and real time event information and warnings to the road user is improving the safety and the efficiency of the network.

Expected and unexpected events can develop into a traffic bottleneck, due to abrupt reactions of uninformed drivers. However, if those drivers know the upcoming traffic situation in advance they would be prepared and could pro-actively adapt their speed and following distance, thus preserving smooth, stable and safe traffic flow.

Forecast and real time event information services allow traffic information to be factored into both pre- and on-trip journey planning. This can alter the departure times, assist the driver to take more effective routing decisions, select another means of transport or even alter the decision to travel.

The provision of information to drivers enhances the travelling experience even if the information does not directly impact on network efficiency or safety. Better-informed drivers tend to be calmer and hence more concentrated. Other impacts are the increased mode share of public transport and reduced air pollution.

Note: Forecasts can - and even should – provoke changes in the behaviour and actions of the different parties involved. If they do so, the resulting real traffic situation may lead to a different outcome than was originally predicted. This could lead to the impression that the original forecast was inaccurate.

1.2.1.3 What is the Mission?

The main service mission is to inform about expected or unexpected events in order to support the road user finding the best way to travel and to do so in a calmer and safer way.

- Expected events and their impacts should be communicated especially when providing forecast information with pre-trip warnings. This information contributes to the general traffic management goals of the road administrator. This can also help drivers on the road if they are planning to make a journey through the area affected.
- Real-time information about unexpected events and their impacts is generally more important for road users already making their journey, although this information can also influence road users planning their trip on a short term basis (such as for a lane closure).
- Unexpected events are more commonly related to dangerous situations and are more important for on-trip warnings; information about these events is disseminated to prevent accidents and influence route choice and therefore to make the road network safer and more efficient. In this case, it is important to provide the information as quickly and as clearly as possible to the road user.

This predictive or real-time information could be provided on-trip and pre-trip using different information channels, accessible or receivable by the road user via different end-user devices. The service may comprise common information as well as individual (personalised, on-demand) information.

Problems to consider:

- to facilitate an easy information access to the road user
- diversity of information portals with different presentations
- incompleteness of information
- diverging interpretation of the information by the road user
- to give highly localised multimedia information (for example images coming from forthcoming CCTV)
- time intervals, lack of timeliness
- variable quality of traffic information

1.2.1.4 EasyWay harmonisation focus

One main focus of this EasyWay-deployment guideline is the internet-based pre-trip and on-trip traffic information used in combination with static or dynamic maps, where events are allocated to a position in the road network by displaying there a specific event pictogram. This type of display is already used by many service providers.

A second main focus lies on providing such information on-trip on Variable Message Signs (VMS), which are operated along and before the access of the route by road operators.

Another focus lies on the interface between road operators and national, regional or local broadcasters, which provide traffic event information to mass audiences through radio or via on-board navigation devices. Through the rapid evolution of mobile phone technology based end user devices the provision of individual (personalised, on-demand) services is increasing.

1.2.1.5 Distinctiveness from other ITS-services

Relevant information for this service is current changes in and forecast of events affecting the road users on its journey. Relevant complementary information, which is not part of the content of this Deployment Guideline and will be covered by other DGs, is:

- cause and duration of traffic disturbances, e.g. incidents, accidents (see TMS-DG05-08 Incident warning and management services), weather (see TIS-DG06 - Weather information services)

- consequences of traffic conditions, e.g. speed limits (see TIS-DG04 - Speed limits services) or traffic conditions and delays (see TIS-DG03/05 - Traffic condition and travel time services)
- recommendation of alternatives (e.g. re-routing or modal shift, see TMS-DG07 - Traffic management plan services for corridor and networks)
- long or middle term forecast of traffic conditions based on historical data (not covered by EasyWay DGs)

The service is directed to the road user and may include general information as well as individual (personalised, on-demand) information. The information provision should be in accordance with any traffic management plans (TMP, see TMS-DG07), which are in operation by the specific road authorities or traffic management centres.

1.2.2 Contribution to EasyWay Objectives

1.2.2.1 Service radar

A general overarching description of contribution of TIS-services to EasyWay objectives is outlined in the "Traveller Information Services REFERENCE DOCUMENT, TIS Deployment Guideline Annex, Version 02-00-00, Chapter 2.2 "Contribution to EasyWay Objectives"

The graph below provides a quantification of the added value of “Forecast and Real-time Event Information” services regarding the three main objectives of EasyWay which are: safety, efficiency and environment. The applied scales for the service radars are based on an expert view and not on specific scientific analysis.

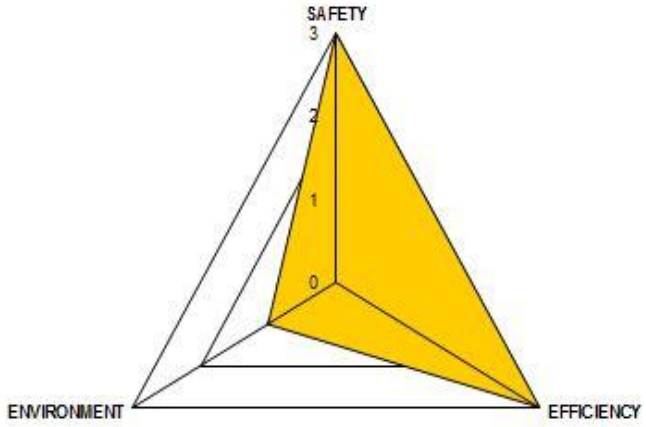

Figure 1: Service radar “Forecast and real time event information”

1.2.2.2 Safety

Information on events can help prevent accidents by warning drivers of dangerous situations, especially for unexpected events related to dangerous situations (flooding, ice …).

1.2.2.3 Environmental impact

It is commonly accepted that this type of information may lead to more efficient network use and in particular support greater use of public transport and by doing so reduce emissions

1.2.2.4 Network efficiency

More informed travel decisions (route choice, mode choice, time of travel) are expected as a result of the provision of event information.

1.2.3 Current status of deployment

Forecast and real-time event information services are currently well developed and widespread across the EasyWay member states. National practice examples across Europe indicate what and how event and warning information services can be provided.

Pre-trip travel planning has developed in recent years from simple TV and radio messages disseminated at specific periods and intervals to dynamic smartphone applications and easy-to-access websites with planned and real time traffic and travel information on interactive mapping. Many European road operators/service providers use websites as a means of information provision, which can assist with journey and route planning. Road network information combined with both historic and real time passenger information enables road users to make informed choices between private and public transport options and help impact on the mode choice of travel.

On-trip information using a Variable Messages Sign (VMS) exists extensively across much of Europe, with a high level of deployment on toll motorway networks (e.g. in France, Spain, Portugal and Italy) and on dense motorway networks where re-routing possibilities exist (e.g. in the Netherlands, Belgium, the UK, and Germany).

Traffic information (spoken word), most of the time both pre-trip and on-trip, is available on several radio stations throughout Europe. Additionally dedicated motorway radio frequencies exist in France, The Netherlands and Italy, with regular traffic broadcast tailored to the region in question.

RDS-TMC (Radio Data System Traffic Message Channel) has been deployed in most Western European countries and deployment is underway or planned in several Central and Eastern European countries. RDS-TMC Plus, available in Austria and free of charge, offers a qualified and faster RDS-TMC service because only relevant near-by information is broadcasted. With the migration to digital broadcast bearers in the future, RDS-TMC is expected to be replaced by TPEG-Services.

Other services include alerts via email and SMS.

The use of in-vehicle navigation systems with traffic information through RDS-TMC is also widespread. These systems tend to have a data connection which offers them the possibility to connect with a service provider. There is also exponential growth in the market for smartphones and software applications which can act as in-vehicle navigation systems and provide road users with pre-trip and on-trip information through mobile websites and social media (i.e. Twitter).

However, the latest developments in forecast and real time event information are traffic applications on smartphones. While some apps provide conventional turn-by-turn satellite navigation, other applications already offer the ability to help the driver avoid traffic and congestion, in some cases even by offering predictive traffic forecasting, which takes into account the day of the week, season, holidays, weather, accidents, road works and special events such as football matches or concerts. Some applications even offer the possibility to view and report traffic accidents.

1.2.4 European Dimension

Forecast and real time event information influences the route chosen by the road users travelling both short and long distance and inter- and intra- national trips throughout Europe. Therefore, service providers should try to provide the information in different languages (if possible) or preferably in a language independent format (by using pictograms, symbols, etc.).

Existing deployments and road user information requirements across Europe are currently very different. So long as differences exist in national policies and investment strategies, stipulating minimum levels of service to be achieved is not practical. However, by defining the Levels of Service and criteria most important to the information service, future deployments can be made in line with this progression towards greater European harmonisation of service levels. Recommendations are given to provide this service in a more European context.

2 Part A: Harmonization Requirements

2.1 Service Definition

"Forecast and Real Time Event Information Services" are defined as the provision of information about both expected and unexpected events to road users on identified road segments of the TEN-T network and interfaces. This predictive or real-time information could be provided on-trip and pre-trip using different information channels, accessible by the road user via different end-user devices. The service may comprise common information as well as individual (personalised, on-demand) information.

"Events" are defined as - expected or unexpected – abnormal situations which may lead to adverse effects on the road as regards to traffic safety, efficiency and environmental effects.

2.2 Functional Requirements

2.2.1 Functional architecture

The function of the service is to provide forecast and real-time event information to road users either pre-trip or on-trip. This may be demand responsive or led by the information providers. In Europe, both private and public information providers are involved in this information provision (see organisational requirements).

The following figure shows the typical functional architecture of a "Forecast and Real Time Event Information Services". The vertical lines drawn between sub-function 1, 2 and 3 show, where it is appropriate to segment the whole functionality of the service into at most three sub-functions:

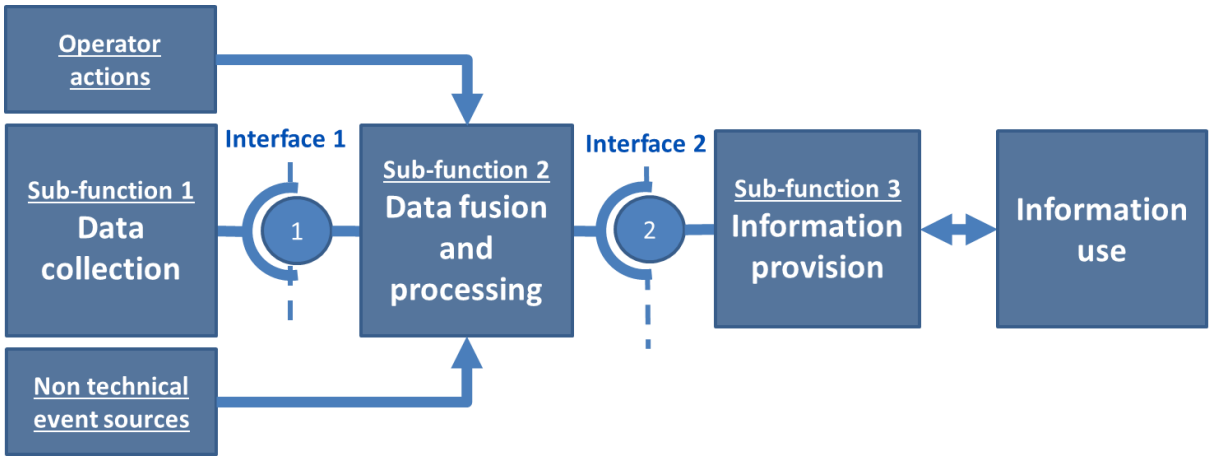

Figure 2: Functional architecture of the service and decomposition in three sub-functions

Functional requirement:

- **FR1**: Functional decomposition into sub-functions with the provision of interfaces **must** be carried out to enable interoperability in cases that the service is carried out by more than one organisation

Functional Advice:

- Functional decomposition is recommended in any case to be prepared to involve yet further parties as may be the case in the future

2.2.2 Functional decomposition[1] and interfaces

2.2.2.1 Sub-function 1 “Data collection”

Devices, tools and methodologies for traffic data collection are not covered by this deployment guideline. They depend amongst other things on the particular data collection system used and are left to the operator to select.

Note: "Data collection" is not only done by automatic data collection systems. "Events" are also announced/signalled by so called non-technical sources such as police, fire brigades, local authorities, road users as well as "generated" by actions of the road operator.

Functional requirements:

- **FR2:** All data and information collected/signalled/generated by both automatic and non-technical sources/road operator actions **must** contain:
  - where applicable, a location code and
  - a time stamp.

  The geographical basis of the location code should be left to the road operator to define, anyway the model of information provision (see FR8, interface 2) **must** respect DATEX II location reference and time stamp models.
- **FR3**: Beneath real time data also historic data **should** be used to generate event predictions.

2.2.2.2 Sub-function 2 “Data fusion and processing”

Note: "Data fusion and procession" includes “data validation and certification”.

Within Europe different methodologies exist to aggregate collected data and other input information for forecast and real-time event information. These methodologies are not covered by the present guideline and are left to the operator to select. They depend amongst others on the particular data fusion and processing system used and particular traffic model applied.

Functional requirements:

- **FR4:** Source, scope and quality (based on a quality model to be defined) of data provided by content owners[2] to content providers **must** be defined by the partners and **must** be part of data interface description.
- **FR5**: The quality of the data **should** not only be defined but **should** also be an important point of consideration.

2.2.2.3 Sub-function 3 “Information provision”

Information provision is carried out by different service providers in accordance with specific business models. The information provision to the road user on end-user devices has to be done using various information channels (see chapter 1.2.3 State of the art). When providing customer oriented forecast and real time event information services, the users' benefit can be increased by providing event information in combination with general traffic information (i.e. see “TIS-DG03/05 - Traffic condition and travel time information”, “TIS-DG04 - Speed limit information” and “TIS-DG06 - Weather information”).

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[1] The ITS service is "distributed" over more than one administration (cross-border, cross-regional) for operation, i.e. different road operators and other parties are involved, providing "logical sub-functions". Between the distributed functions interoperability must be guaranteed by properly specified interfaces.

[2] Definition and description of the key actors: see "Traveller Information Services REFERENCE DOCUMENT, TIS Deployment Guideline Annex, Version 02-00-00", Chapter 3.1

Functional requirement:

- **FR6**: Beneath the means of information provision (information channels and end user devices), where applicable the area (territory) and locations of information dissemination **should** be defined in relation to the media used

2.2.2.4 Interface Requirements

Note: If the ITS service is "distributed" over more than one administration (cross-border, cross-regional) for operation, i.e. different road operators and other parties are involved, providing "logical sub-functions", interoperability between the distributed functions must be guaranteed by properly specified interfaces.

Interface requirement interface 1 (see also Technical requirements, DATEX II profiles):

- **FR7**: To enable interoperability between all involved parties the sub-functions "data collection and "data fusion and processing" and **must** - depending on the used data type for the automatic event detection - require/provide an interface 1 with at least one or several of the following information structures:
  - traffic volume and speed, occupation rate (e. g. collected by loops, radar, video…)
  - trajectories (travel time per itinerary e. g. collected by APNR - automatic number plate recognition, video…)
  - travel time (e. g. collected by Taxi FCD, Navigation Systems, Phone Data, …)

Interface requirement interface 2 (see also Technical requirements, DATEX II profiles):

- **FR8**: To enable interoperability between all involved parties the sub-functions "data fusion and processing" and "information provision" **must** require/provide an interface 2 with the following event information structure (if no information is available for an element, value can be left void):
  - (estimated) impact on traffic situation
  - start and estimated end (date, time)
  - position (location code) and estimated spatial dimension
  - type, cause (optional)
  - comment (free text)
  - information source
  - means of information provision

2.3 Organisational Requirements

A general overarching description of the key actors, their roles in the value chain and the related conditions for TIS-service provision is outlined in the "Traveller Information Services REFERENCE DOCUMENT, TIS Deployment Guideline Annex, Version 02-01-00":

- Chapter 3.1 "Introduction to key actors in the traveller information chain" and
- Chapter 3.2 "Conditions for Service Provision - Business Model"

The following picture shows the historical grown organisational architecture of forecast and real time event Information Services:

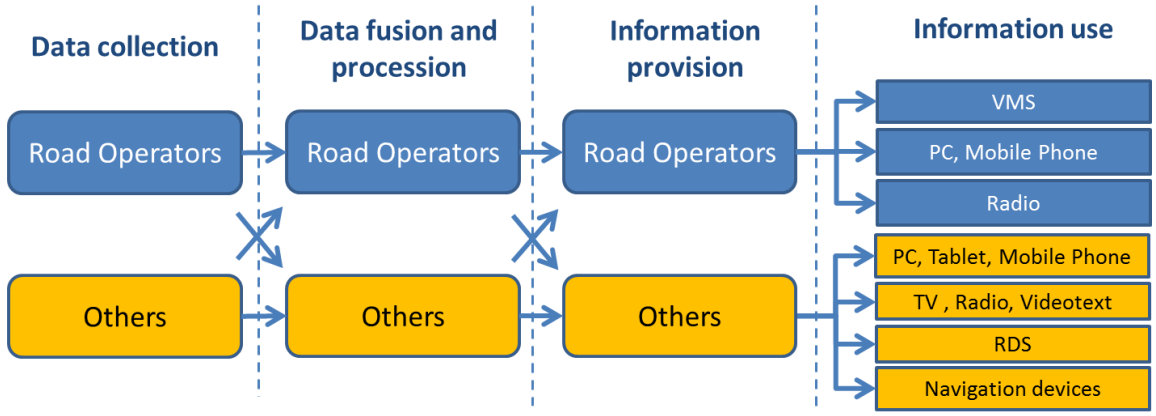


Figure 3: Forecast and Real Time Event Information Services – organisational architecture (historical)

Currently the historical models for distribution of data are changing dramatically. Various possible combinations of cooperation between road operators and others parties show the following figures:

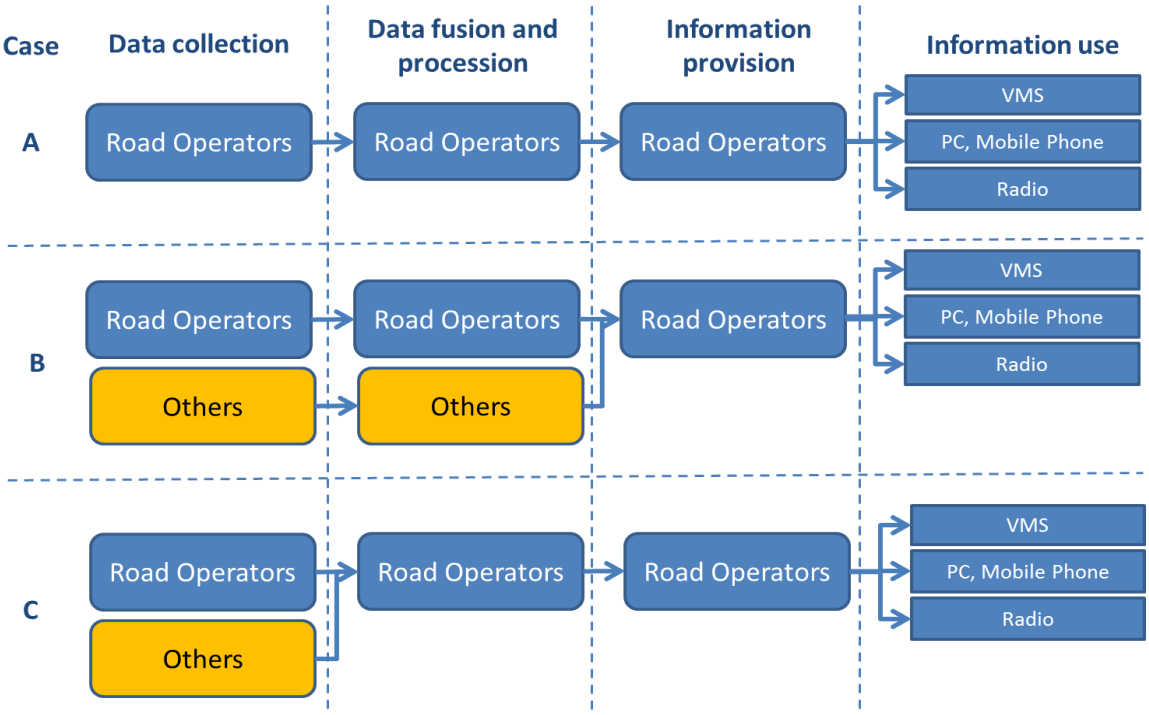


Figure 4: Organisational architecture – road operator point of view

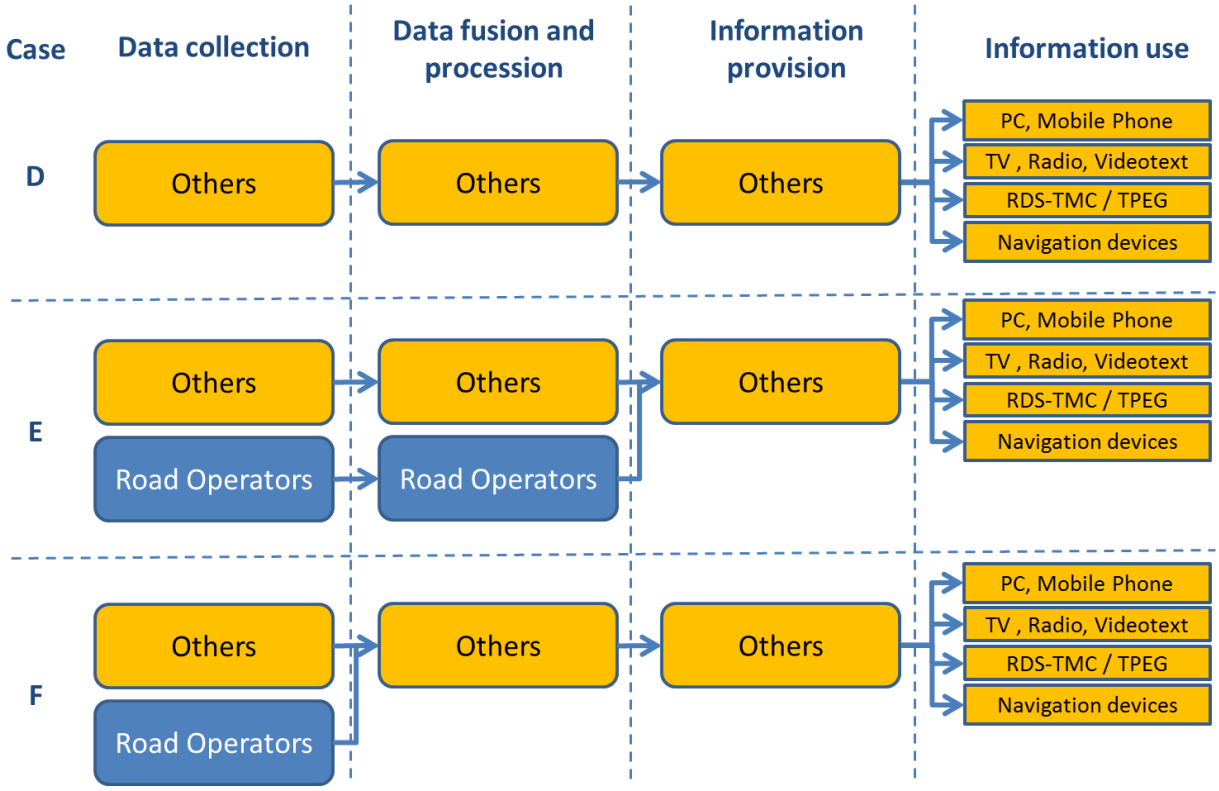


Figure 5: Organisational architecture – others (not road operator) point of view

Note: Even though partners involved in the service can be either public or private road organisations as well as public or private service providers, who are legally autonomous in varying degrees and in the international context sometimes even work on different national laws, it is not required to define organisational aspects on a legal and binding basis.

Organisational advice:

- Where different autonomous parties are involved, clear definitions of organisational aspects are a crucial precondition for a successful implementation of a "Forecast and real-time event information service". These definitions should be documented in the form of e.g. a “Common partner arrangement” or a “MoU - Memorandum of understanding” which establish the roles and responsibilities of the respective parties to any co-operation and be agreed by all parties/partners involved.

  The documents should also define modes of co-operation in a set of operational instructions. They should be thoroughly checked and verified prior to acceptance. These documents are a declaration of intent of the rules of engagement but are not legally binding. The agreement should be concluded in written form, on the one hand, because the service provision requires a clear understanding of the co-operation, but on the other hand can be seen as a milestone in the negotiation which may provide an appropriate media opportunity.

  Particularly in “Forecast and Real Time Event Information Service” various “third parties” play an important role providing event information, which cannot be automatically detected (non-technical sources). These parties and their role in the organisational structure of the ITS-service must be paid special attention in final agreements/contracts.

Organisational requirements:

- **OR1**: The organisational and operational structure of the service as well as the role of each public organisation/body and its exact responsibility and task in the chain **must** be defined.

- **OR2**: All for successful implementation of a "Forecast and Real Time Event Information Service" necessary organisational aspects **must** be documented and agreed by all involved parties/partners to fix the co-operation.
- **OR3**: All necessary collaboration processes/workflows and interfaces **must** be described.
- **OR4**: The information provision **should** be in accordance with any management plans (TMP, see TMS-DG07) which are in operation of the road authorities or traffic management centres.

2.4 Technical Requirements

2.4.1 ICT Infrastructure requirements

No specific requirements or advice.

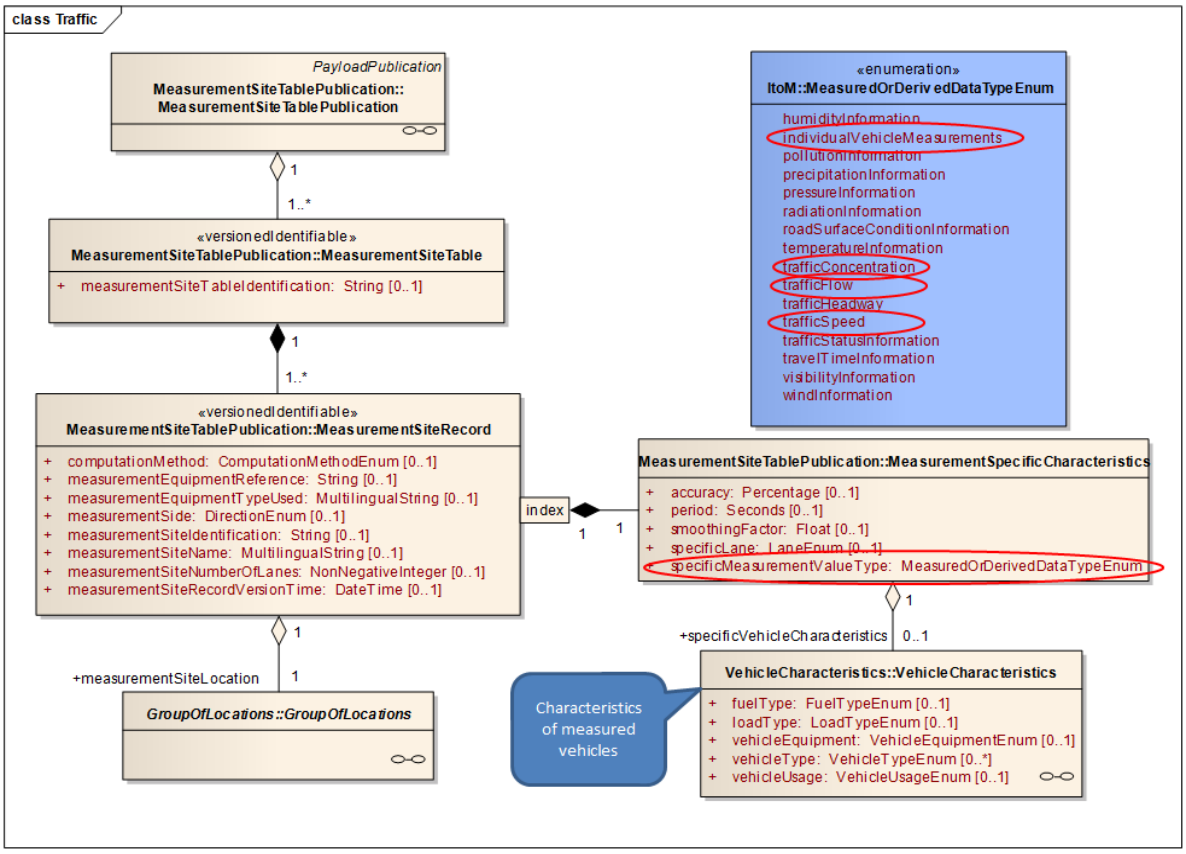
2.4.2 Standards and Agreements: Existing and Required

2.4.2.1 DATEX II-Profiles

Interoperable interfaces between systems are essential for many EasyWay objectives like continuity of services and cross-border traffic management cooperation. Hence, EasyWay has itself decided to actively contribute to the establishment of the required standardisation efforts by launching its dedicated working group ESG5 and liaising with the relevant European standardisation body, namely with CEN TC278 WG8 ("Road Traffic Data"). The result of this cooperation is the "DATEX II" specification for interoperable machine-to-machine communication of ITS services, available as European Standard CEN/TS 16157. This specification is used throughout EasyWay for interoperable access to dynamic traffic and travel data.

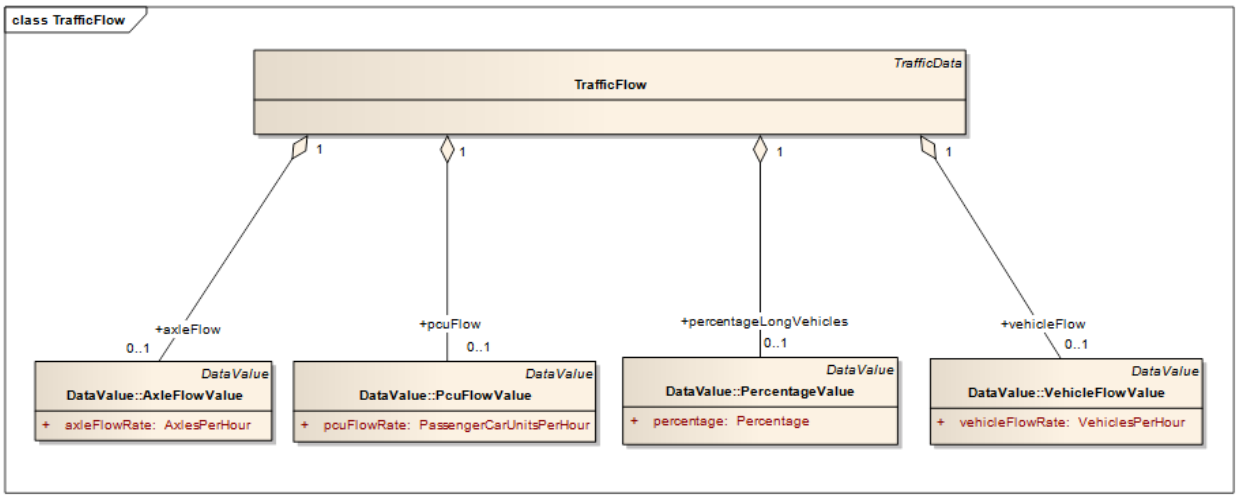
Technical requirement:

- **TR1**: In case road operators have to exchange data requiring interoperability between two or more different organisations (data providers and service providers) involved in the forecast and real time event information value chain the corresponding DATEXII profiles[3] **must** be used for **interface 1** (as defined by FR7):
  - Static information: measurement site information

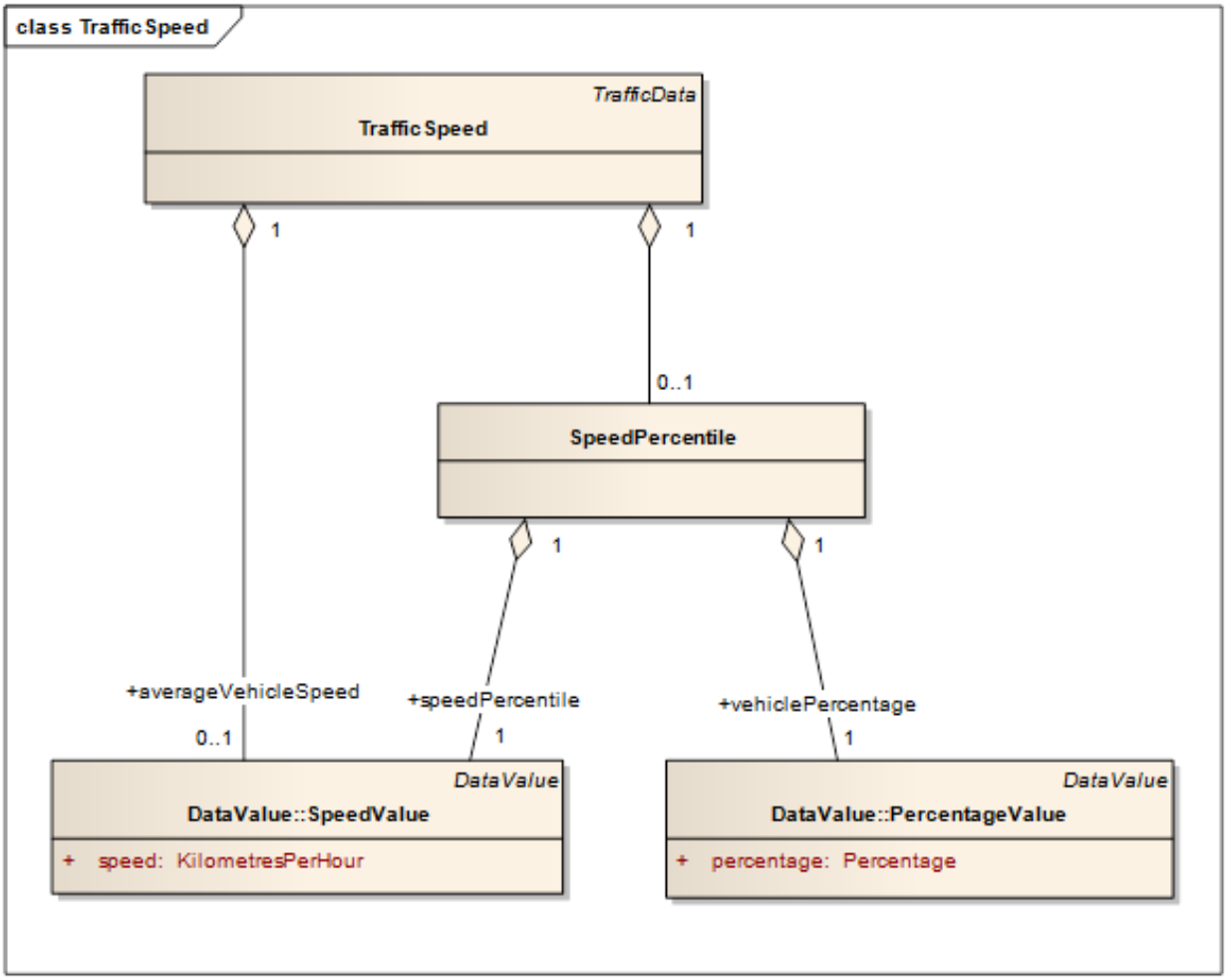


[3] DATEX II profiles consist of a set of data elements taken from the overall DATEX model and can include a subset (schema) of relationships between those elements

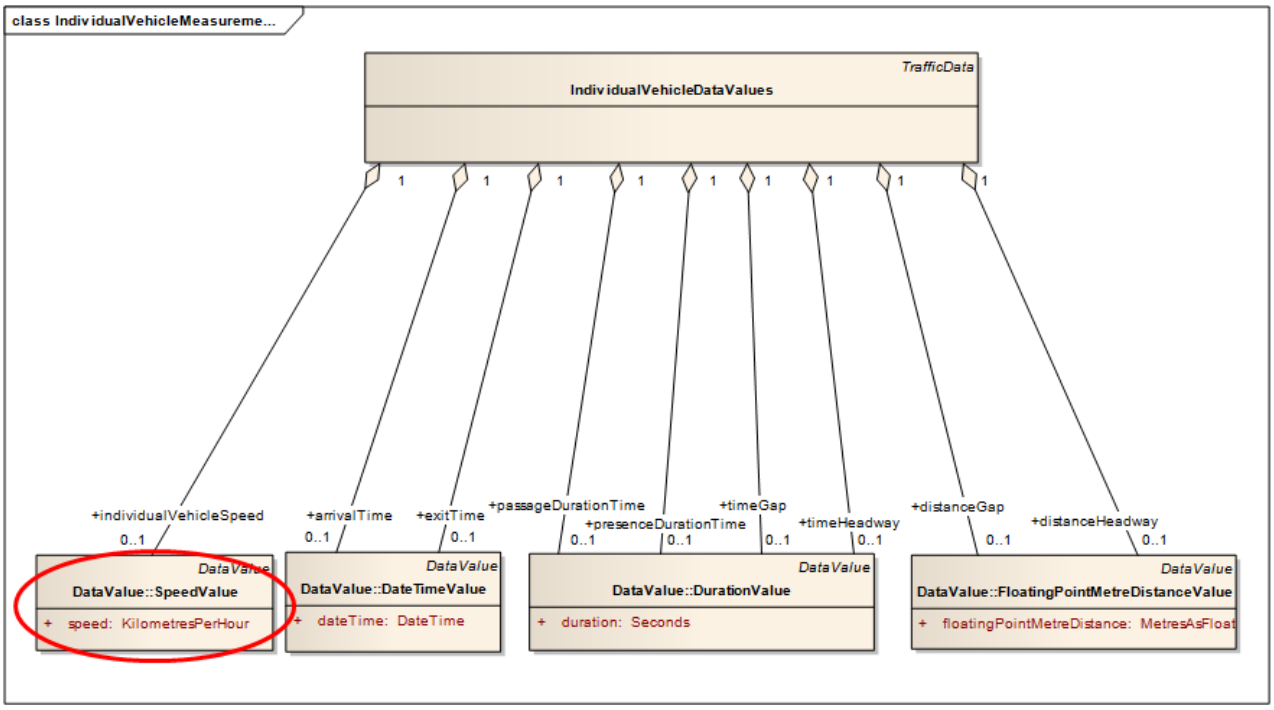
- Dynamic information - Data Collection: Traffic flow



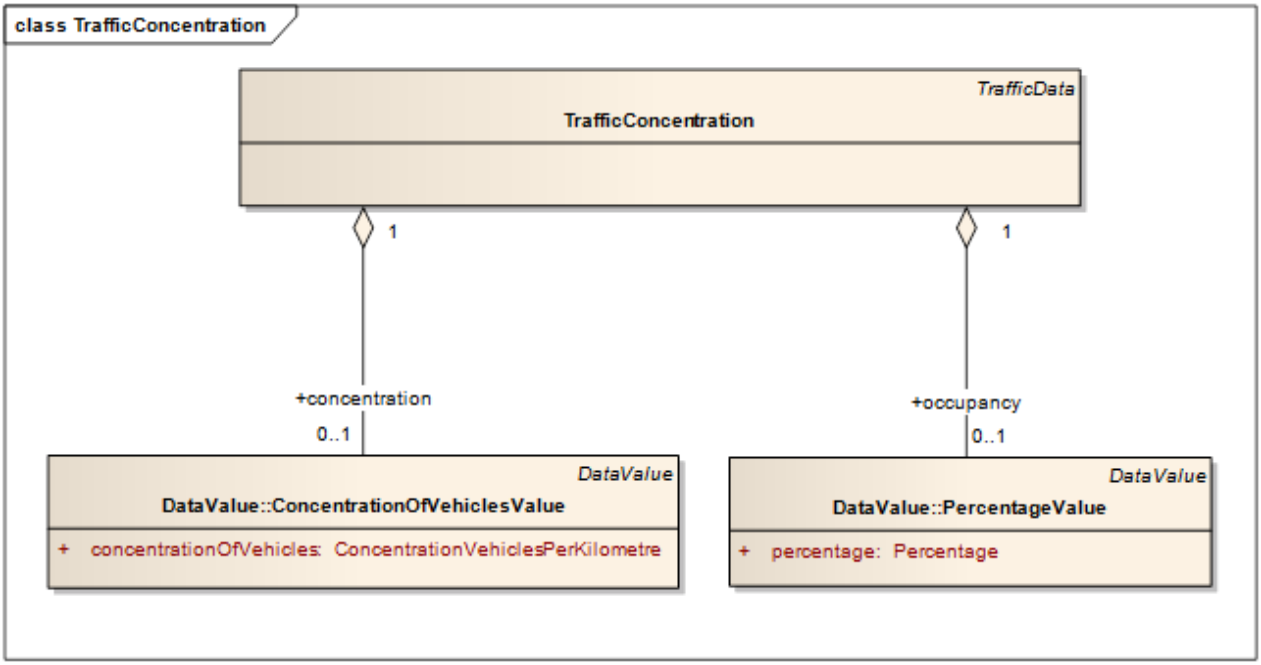
- Dynamic information: Traffic speed (average)



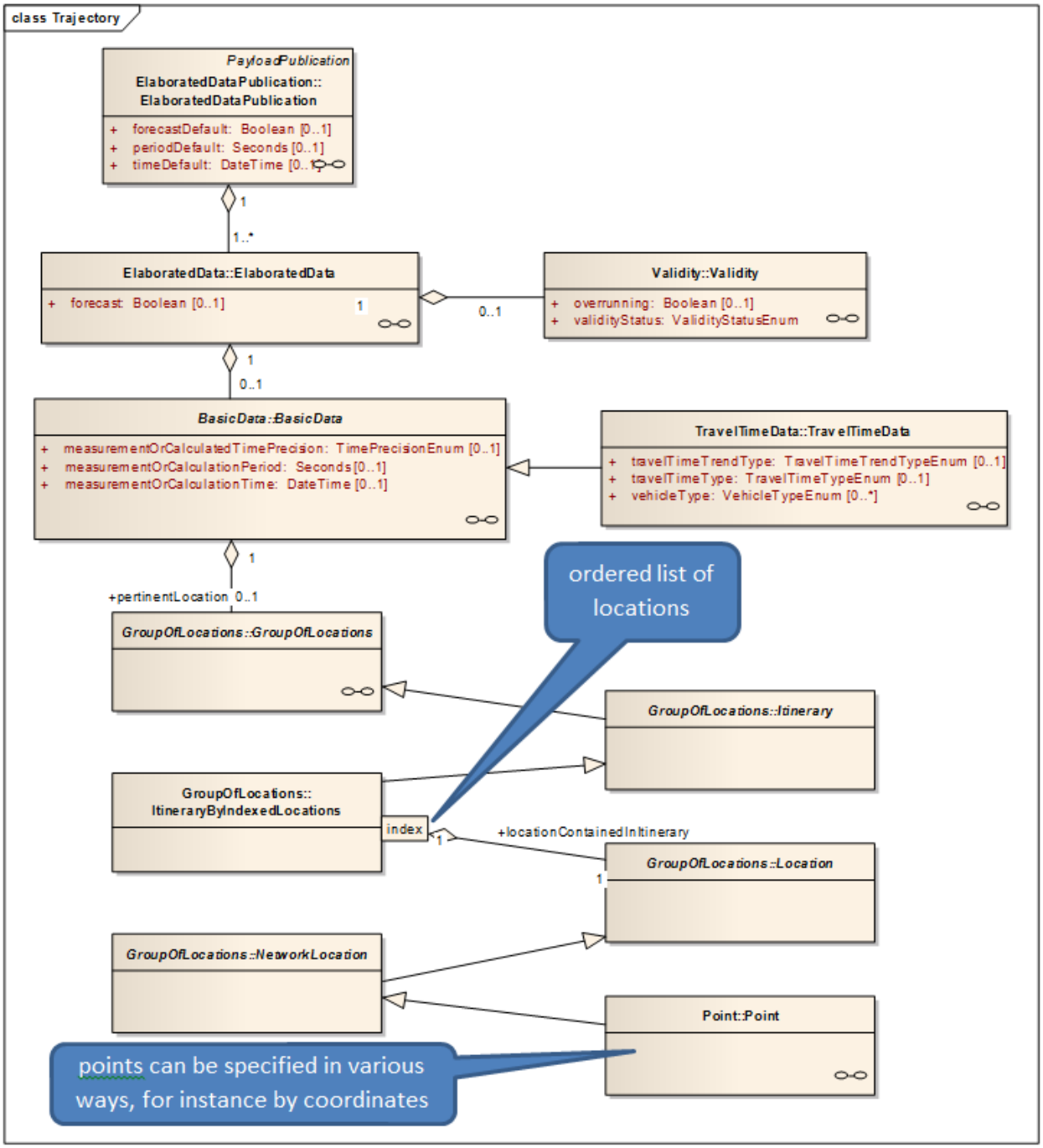
- Dynamic information: Traffic speed (single vehicle)



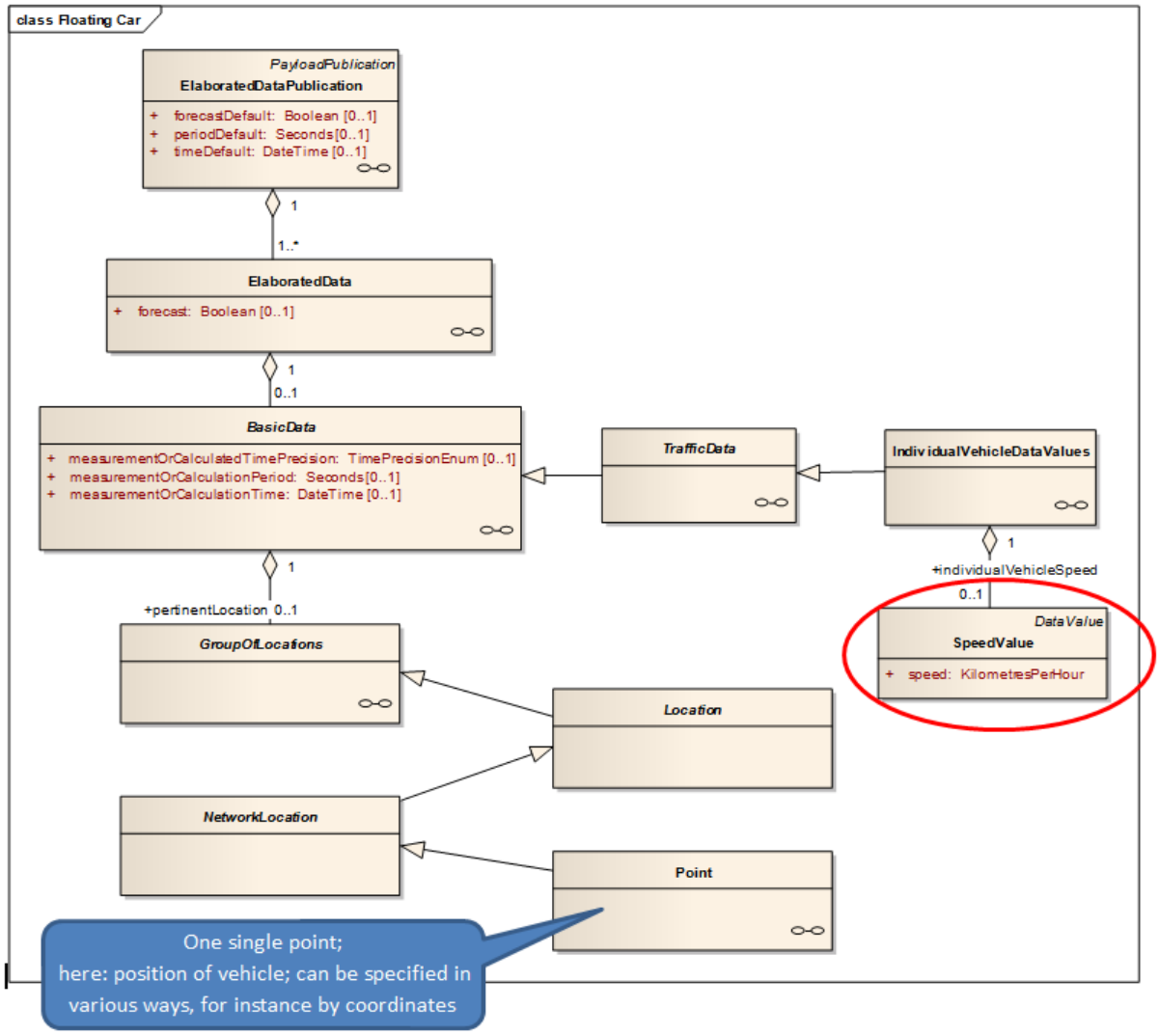
- Dynamic information: Occupancy rate



o Dynamic information: Trajectories (proposal to use itinerary → vehicle speed per itinerary)

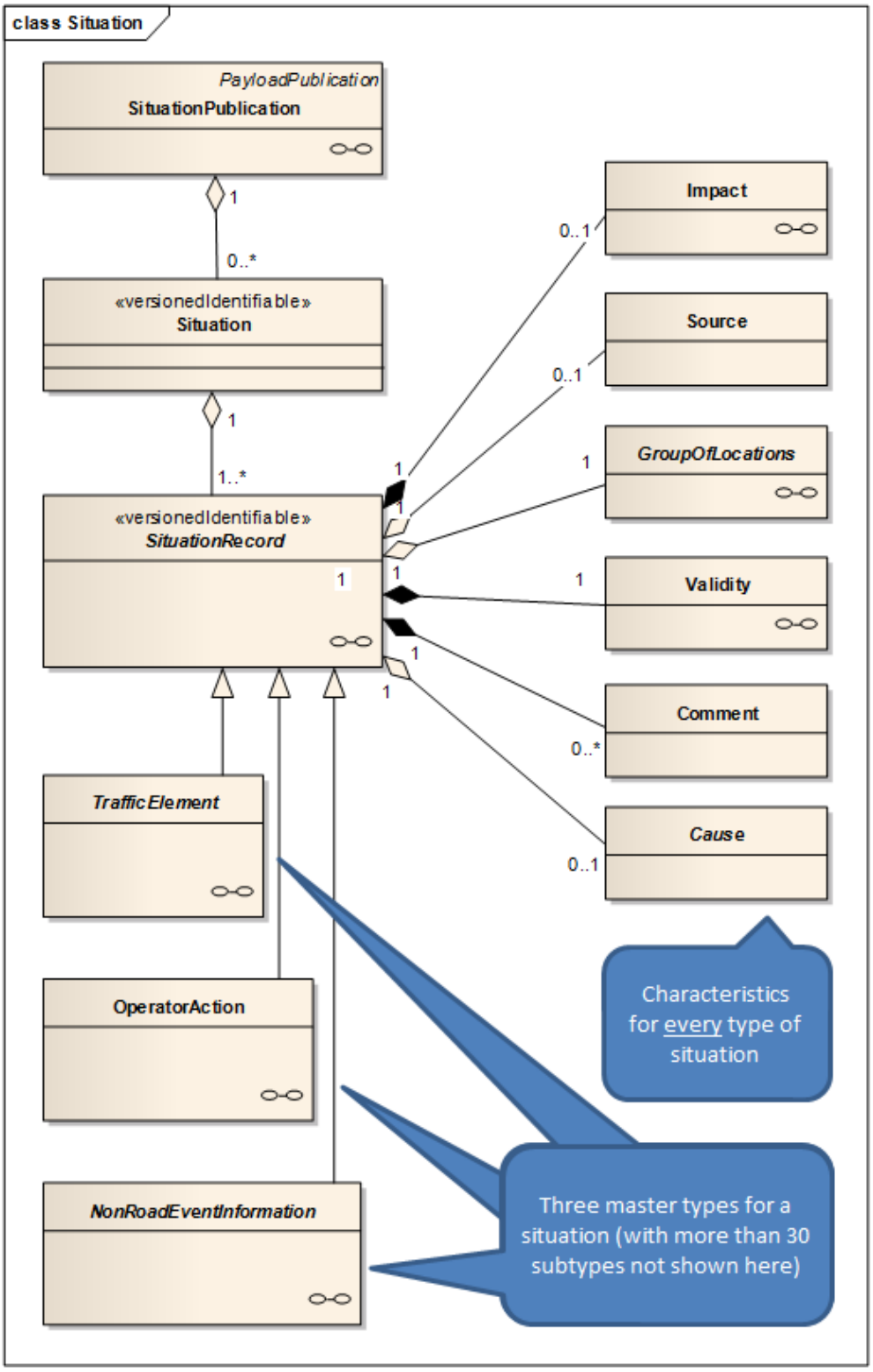


o Dynamic information: Floating car data (proposal)



Technical requirement:

- **TR2**: In case road operators have to exchange data requiring interoperability between two or more different organisations (data providers and service providers) involved in the forecast and real time event information value chain, the corresponding DATEXII profiles **must** be used for **interface 2 (**as defined by FR8)**:**



Note: EasyWay provides DATEX II profiles to support core service deployment in the domains of Traffic Management, Traffic Information and Freight & Logistics services. These profiles describe a subset of the DATEX II data model, tailored to the needs of the particular core service. If these deployments have a special requirement to support particular downstream standards used in subsequent stages of the service delivery chain, it may become important to tailor these profiles further and to use only the cross-section between the TIS/TMS/FLS-DGnn profile and a DATEX profile tailored for interoperability to the particular downstream standard.

As an example, a TIS profile may allow for multiple location referencing methods, but if dissemination of the information via RDS-TMC is envisaged by a particular deployment, compliance with the ALERT-C standard is essential since this standard only supports the use of ISO 14819-3 location codes. Hence, it might be preferable to tailor the EasyWay TIS profile further to use only ALERT-C location codes to ensure that the service provider can use the data provided.

Technical requirement:

- **TR3**: To enable interoperability between different organisations involved in the forecast and real time event information service the mapping of events to the relevant information provision standards TPEG, ALERT-C **should** be considered.

2.4.2.2 Need for Additional Specifications

None

2.5 Common Look & Feel

Common Look & feel requirements:

- **CL&FR1**: Information for the end user **should** always be consistent whatever media or end user device is used.
- **CL&FR2:** The display of signs/pictograms on VMS or other end-user devices **should** be in accordance with prevailing national road codes and where applicable in line with the requirements of the EW-DG VMS-DG01 - VMS Message Design Principles:
  - MS which ratified the 1968 Convention MUST respect the 1968 Convention and SHOULD consider the Consolidated Resolution on Road Signs and Signals (R.E.2);
  - MS which did sign but not ratify the 1968 Convention SHOULD follow the 1968 Convention and also consider the R.E.2**.**

  It is up to the deploying road operator to ensure that real signs are well and widely understood by the road users.

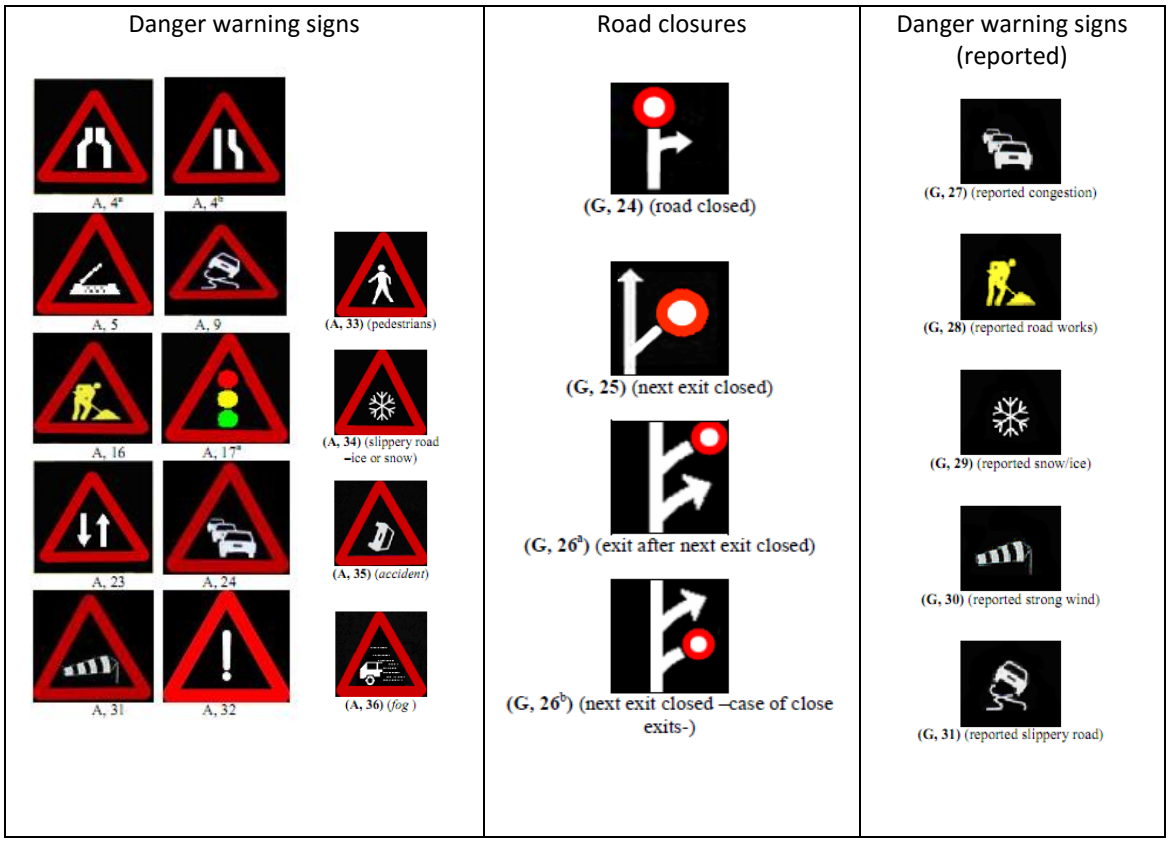


Figure 6: Vienna convention - Event information signs

2.6 Level of Service Definition

2.6.1 Preliminary remark

The scope of EasyWay is to provide Core European Services to the European road users. These services are harmonized in content and functionality, but also in their availability: The road users shall be able to expect a certain services offer in a specific road operating environment. In order to provide a basis for the harmonization process EasyWay needs a tool to define such environments in an agreed manner. This tool is the Operating Environments – a set of pre-defined road environments combining physical layout of the road and network typology with traffic characteristics.

In essence, EasyWay has agreed on a set of 18 pre-defined Operating Environments (OE) where each OE is a combination of three criteria:

- Physical characteristics – Motorways, other 3/4 lane roads or 2-lane roads
- Network typology – Corridor, Network, Link or Critical spot
- Traffic characteristics – Traffic flow and road safety situations (with optional additions)

For more information and details, visit https://dg.its-platform.eu.

2.6.2 Level of Service Criteria

The Levels of Service (LoS) definition of Forecast and Real Time Event Information Services follows the general Levels of Service definition (core criteria) outlined in "Traveller Information Services REFERENCE DOCUMENT, TIS Deployment Guideline Annex, Version 02-00-00"chapter 5.1 "Levels of service and quality"

Levels of Service Table: Forecast and real Time Event Information			
Core Criteria	**A**	**B**	**C**
User interface* (Language)	One fixed language (all official languages)	Information available is capable of being provided in addition in a common and shared language	Information available is capable of being provided independent of language
Neighbouring Provision	No traffic information exchange	Information exchange to neighbouring only	Neighbouring and beyond information provider exchange
Local and secondary Network Information	None (only information on TEN-T road network)	Exchange and use for strategic non TEN-T road network (key roads)	Additional information on local routes with impact on the TEN-T road network
Level of Detail (Location Reference)	Road or location name	Route specific segments (between 2 junctions)	Road segment specific (approx. 1 km or precise location)

Table 2: Level of Service

The “Levels of Quality table” reflects the requirements of the data quality which are needed for "Forecast and Real Time Event Information Services". This table is not end-user oriented as the Table 2: Level of Service. The definitions of the below-mentioned table are according to the ISO/PDTR 21707[i] standard.

Levels of Quality Table: Forecast and Real Time Event Information				
Criteria	**0**	**1**	**2**	**3**
Accessibility	Only on hotspots	On main routes where problems often occur	On all routes	
Availability	Not guaranteed	Guaranteed to a minimum level	Guaranteed to a medium level	Guaranteed all the time
Timeliness	Not guaranteed	30 min – 15 min	15 min – 1 min	around 10 s
Update frequency	Only on an irregular basis	On a regular basis	As frequent as currently possible	
Quality Assurance	No regulation	Either input or output (partial check)	Service chain check (full)	Information Quality Assurance
Cross Verified	Not defined	Data from one or more sources – reliability not confirmed	Data from one or more sources – reliability confirmed	Collaboration from more than one source (data fusion) – reliability confirmed
Accuracy	N/A	N/A	N/A	N/A
Service Grade	Not guaranteed	Guaranteed to a time interval	In real time	
Forecast Horizon	Only current situation	Current situation and short time prediction	Current situation and short as well as long time prediction	

Legend:

See "Traveller Information Services REFERENCE DOCUMENT, TIS Deployment Guideline Annex, Version 01-02-00, chapter 5.1 "Levels of Service and Quality" for core criteria definitions (Accessibility, Availability, Timeliness, Update Frequency, Quality Assurance, Cross Verified and Accuracy).

- Accuracy: This criterion is covered by
  - LoS: Level of Detail and
  - LoQ: Forecast Horizon.
- Service Grade: A specific data quality criterion, in which the service is guaranteed.
- Forecast Horizon: A specific data quality criterion, which defines the prediction time for the service.

Table 3: Levels of Quality table

2.6.3 Level of Service Criteria related to Operating Environment

Level of service requirement:

- **LoSR1**: In the case that pre-deployment surveys / evaluations provide the necessary evidence to proceed with the deployment of the ITS-service "Forecast and real time event information", the minimum and optimum LoS **should** respect the following Level of Service to Operating Environment mapping table.

FORECAST & REAL TIME EVENTS INFORMATION SERVICES			EasyWay OPERATING ENVIRONMENT																
Criteria for the Levels of Service			C1	T1	T2	T3	T4	R1	R2	R3	R4	R5	R6	R7	R8	S1	S2	N1	N2	P1
User Interface	C	Information available is capable of being provided independent of language	O	O	O	O	O		O		O		O		O	O	O	O	O	O
	B	Data available is capable of being provided in addition in a common and shared language.	M					O		O		O		O						
	A	One fixed language (all official languages)		M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
Neighbouring Provision	C	Neighbouring and beyond Information Provider exchange	O																	
	B	Information exchange to neighbouring only	M	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
	A	No traffic information exchange		M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
Local and secondary Network Information	C	Additional information on local routes with impact on the TEN-T road network	O																	
	B	Exchange and use for strategic non TEN-T road network (key roads)		O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
	A	None (only information on TEN-T road network)	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
Level of Detail (Location Reference)	C	Road segment specific (approx. 1 km or precise location)	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
	B	Route specific segments (between 2 junctions)	M	M	M	M	M										M			M
	A	Road or location name						M	M	M	M	M	M	M	M	M		M	M	

Recommendations for LoS per OE:			
M	Minimum LoS recommended	O	Optimum LoS recommended
OM	Minimum = Optimum	NA	Not relevant

Table 4: Level of Service to Operating Environment mapping table

OE	Explanation
C1	critical spots, local flow-related traffic impact and/or potential safety concerns
T1	motorway (link), no flow-related traffic impact and no major safety concerns
T2	motorway (link), no flow-related traffic impact, potential safety concerns
T3	motorway (link), seasonal or daily flow-related traffic impact, no major safety concerns
T4	motorway (link), seasonal or daily flow-related traffic impact, potential safety concerns
R1	two-lane road (link), no flow-related traffic impact, no major safety concerns
R2	two-lane road (link), no flow-related traffic impact, potential safety concerns
R3	two-lane road (link), seasonal or daily flow-related traffic impact, no major safety concerns
R4	two-lane road (link), seasonal or daily flow-related traffic impact, potential safety concerns
R5	three-/four-lane road (link), no flow related traffic impact, no major safety concerns
R6	three-/four-lane road (link), no flow related traffic impact, potential safety concerns
R7	three-/four-lane road (link), seasonal or daily flow related traffic impact, no major safety concerns
R8	three-/four-lane road (link), seasonal or daily flow related traffic impact, potential safety concerns
S1	motorway corridor or network, at most seasonal flow-related impact, possibly safety concerns
S2	motorway corridor or network, daily flow-related traffic impact, possibly safety concerns
N1	road corridor or network, at most seasonal flow-related traffic impact, possibly safety concerns
N2	road corridor or network, daily flow-related traffic impact, possibly safety concerns
P1	peri-urban motorway or road interfacing urban environment, possibly safety concerns

OE type	Number	Flow-related traffic impact				Potential safety concerns	
		NO	SEASONAL	DAILY		NO	YES
Critical spots							
C	1		X	X	and/or		X
Motorway links							
T	1	X			and	X	
	2	X			and		X
	3		X	X	and	X	
	4		X	X	and		X
Road links							
R 2 lanes	1	X			and	X	
	2	X			and		X
	3		X	X	and	X	
	4		X	X	and		X
R 3 or 4 lanes	5	X			and	X	
	6	X			and		X
	7		X	X	and	X	
	8		X	X	and		X
Motorway corridor or network							
S	1		X		and		(X)
	2			X	and		(X)
Road corridor or network							
N	1		X		and		(X)
	2			X	and		(X)
Peri-urban motorway or road							
P	1				and		(X)

Table 5: Legend - EasyWay Operating Environments for Core European ITS Services.

3 Part B: Supplementary Information

The EasyWay Deployment Guidelines contain two main elements:

- *Part A elaborates on the content of the ITS service addressed, describing the entire deployment framework including Requirements and Levels of Services.*
- *Part B is an appendix of informative content. Its objective is to illustrate part A with examples and feedback from deployments in the field.*

Part B is a lively chapter – in contrast to Part A, which by nature should be stable for a certain time – and subject to continuous development and update. The focus of Part B lies on national practices and experiences which, as cross-fertilisation material, can benefit any road operator in Europe and which are documented in Chapter "3.1 Best Practice" consisting of two main sections:

Examples of deployment 2010 - 2012

This section consists of contributions delivered by those EasyWay-Partners that have actively participated in the development and editing of the EW Deployment Guidelines 2012. Against this background, the examples - in detail listed in Chapter "3.1.1 Examples of deployments 2010 - 2012" – reflect the state of the art at the end of the year 2012. As such they delivered the basis for the discussion of the EW-deployment guideline development process and the setup of Part A "Harmonization requirements" at this point in time. But this means also that no direct relation or compliance to the harmonization requirements of Part A (as they are listed in the Compliance checklists in Annex A) can be assumed for these examples. Nevertheless, the given examples provide a concrete documentation of the state of the art at that time and in most cases, they can still be considered as current best practice.

EIP/EIP+ user and application survey 2013 - 2015

In trying to keep Part B up-to-date, the EasyWay follow up project EIP (European ITS Platform) – launched in 2013 – started two phases of activities to contribute to Part B by collecting user as well as application experiences (both technical and organisational) of national deployments that applied or at least considered the EW-DG 2012:

- *In the time period from the beginning of 2013 to the end of 2014, the EIP work programme provided essential post-processing steps to improve the usability of the DGs in ITS deployments and further to reflect the initial experiences and feedback gained with the guidelines since their release at the end of the year 2012.*
- *In 2015, the EIP+ work programme contained a follow-up activity with the goal to monitor and collect feedback on the application of the DGs in the five European ITS Deployment Corridor projects and to consolidate reporting of the results, lessons learned and best practices concerning the DG practicability and the compliance with the DG requirements on a European scale.*

The results of those two activities are based on responses on questionnaires which were circulated to national ITS deployment experts and European ITS corridor projects and finally are reflected in Chapter "3.1.2 EIP/EIP+ user and application survey 2013 - 2015".

3.1 Best Practice

3.1.1 Examples of deployment 2010-2012

Contributions to this chapter were delivered by those EasyWay-Partners which have participated actively to the development and editing of the EW Deployment Guidelines 2012. Against this background, the listed examples reflect the state of the art at the end of the year 2012. As such they delivered the basis for the discussion of the EW-deployment guideline development process and the setup of Part A "Harmonization requirements" at this point in time. But this means also no direct relation or compliance to the harmonization requirements of Part A (as they are listed in the Compliance checklists in Annex A) can be assumed for these examples. Nevertheless,

the given examples provide a concrete documentation of the state of the art at that time and in most cases they can still be considered as current best practice.

3.1.1.1 INRIX Traffic application

The INRIX Traffic application is a free application for smartphones, available on BlackBerry App World, iTunes App Store, Android Market, Amazon and Windows Phone 7. One of the applications key features is the ability to help the driver avoid traffic and congestion by using real-time, crowd-sourced traffic information from a worldwide network, combined with road sensor data and accident reports. It is also possible to get forecast traffic information eight hours in advance.

Figure 7: INRIX Traffic application on different smartphones

On the road, the driver can report incidents and police activity along his route to help the community using the application.

For more information on this application, please see: http://www.inrixtraffic.com/

AASHTO (American Association of State Highway and Transportation Officials) introduced a mobile application which delivers the latest news about smart highways and the future of America's roads - as well as INRIX's real-time traffic information. For more information, please see: http://news.transportation.org/press_release.aspx?Action=ViewNews&NewsID=383).

3.1.1.2 Traffic information via website in Flanders, Belgium

Euro-Region	CENTRICO
Country	Belgium
Location	Flanders TEN-T road network
Name of organisation	VlaamsVerkeerscentrum
Contact Name	JozefCannaerts
Contact Email	jozef.cannaerts@mow.vlaanderen.be

Real time event information are available to the public via national radio, RDS-TMC and a public website, http://verkeerscentrum.be. This website also provides forecast information. The Flemish traffic centre also provides a website for mobile devices: http://filebeeld.be. Additionally, information can be obtained on maps, text-only and 'rush-hour'-mail. Slightly-delayed webcam-images are also available. As a test project, displays travel times around the city of Antwerp can also be found on the website and on VMS panels.

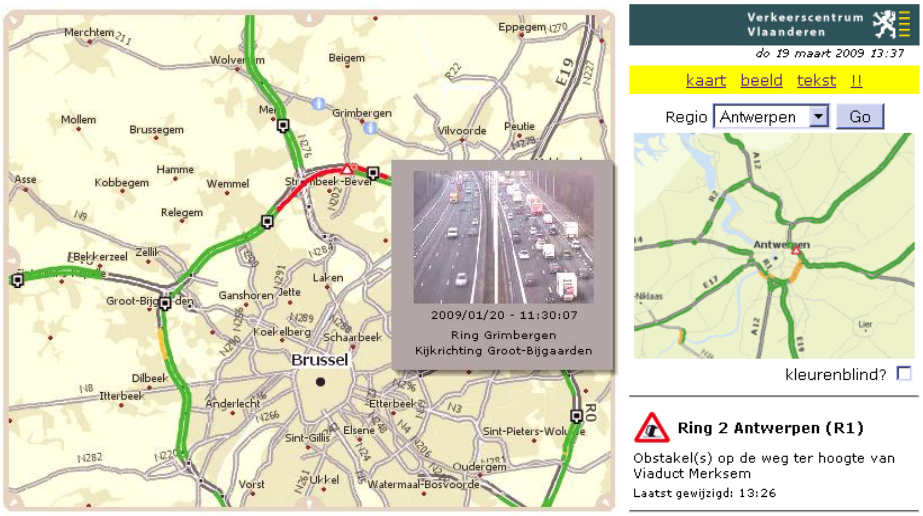


Figure 8: Public traffic information (standard and mobile) websites in Flandersii

Also in Flanders, VMS panels with P+R information can be found on the E17 and E19. In the future these panels will display travel times for public transport.

Figure 9: VMS panels with P+R information in Flanders on the E17 and E19

3.1.1.3 Traffic information via internet in Spain

Euro-Region	Advanced Road Traffic in South-West (ARTS)
Country	Spain
Location	The whole Spanish TEN-T road network
Name of organisation	Spanish Directorate General for Traffic (DGT)
Contact Name	Juana Fernández (DGT)
Contact Email	Juana.Fernandez@dgt.es
URL	http://infocar.dgt.es/etraffic/

Since the year 2007 the Spanish Traffic Road Administration (DGT) has been providing real-time traffic information via a web application called eTraffic. The service integrated different sources of traffic data in Google Maps. The end user can access (via a single map application) all traffic information as well as the ITS road equipment installed in the Spanish TEN-T (road network) directly. An end user will additionally be able to not only check all information these equipment provide but also historical information from these equipment.

The project is a national development but entirely scalable due to use of Google maps. Furthermore, it currently allows the possibility to access traffic data from different European organisations via DATEX.

Figure 10: e-Traffic service in Spain

3.1.1.4 Real time event information, provided by "LägetiTrafiken", Sweden

Euro-Region	EasyWay Viking
Country	Sweden
Location	Sweden
Name of organisation	Trafikverket (the Swedish Transport Administration)
Contact Name	ClasRoberg,
Contact Email	clas.roberg@trafikverket.se
Web link	http://trafikinfo.trafikverket.se/litmenu/litmenu.htm#id=380

Service Description:

Real time event information is displayed on the web site “LägetiTrafiken”. This service is seen as safety related traveller information which should be delivered free of charge to the public. The info is collected and processed by the national TIC/TMC’s. This service displays the general information.

Level of service:

User interface	Available languages of the service: Swedish, English
Neighbouring Provision	The information is also delivered to other service providers via standardized DATEXII interfaces.
Local and secondary Network Information	Nation wide on TERN + main roads

LägetiTrafiken Screenshot:

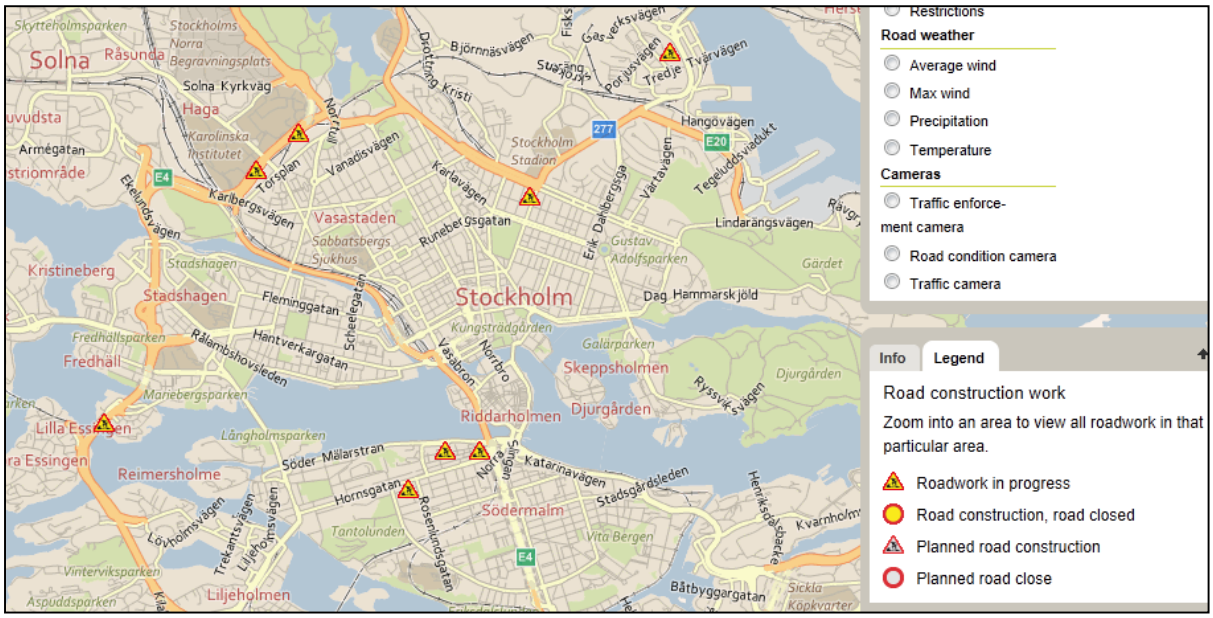


Figure 11: "LägetiTrafiken"

3.1.1.5 VMS in France

Figure 12: VMS in France - example 1

Figure 13: VMS in France - example 2

Figure 14: VMS in France - example 3

3.1.2 EIP/EIP+ user and application survey 2013 - 2015

3.1.2.1 Results “Concept and Practicability” questionnaire

For this DG the questionnaire was answered by three member states.

- Most of the functional, organisational and common look&feel requirements are easy to apply, the costs are low and the acceptance is in general medium to high.
- The technical requirements for data exchange and the functional requirement for interfaces are not applicable for one member state, because DATEX II is only used for the development of new functionalities, currently other standards like ALERT-C and TPEG are in use.

3.1.2.2 Results "Compliance checklists” questionnaire

The compliance checklist for this DG was answered by 14 project. Most of the functional, technical and organisational requirements were met. Overall the Deployment Guideline was accepted and complied.

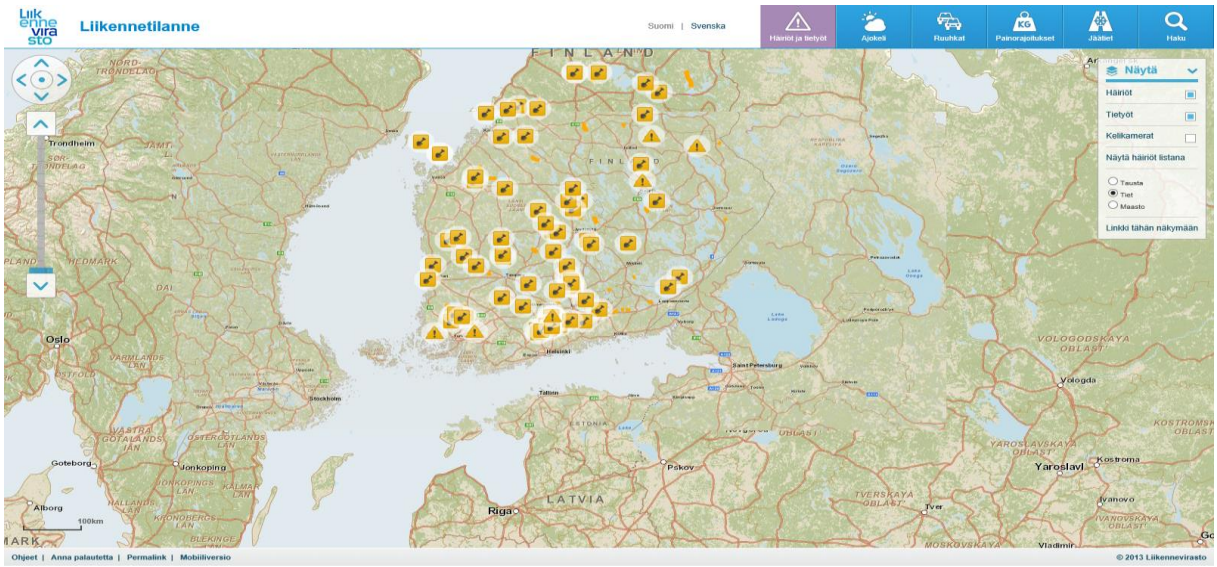
3.1.2.3 New best practice examples of deployment 2013-2015

Traffic information via website in Finland

Euro-Region	VIKING
Country	Finland
Location	Finland road network
Name of organisation	Finnish Transport Agency
Contact Name	Tomi Laine
Contact Email	tomi.laine@strafica.fi

A new travel time information service (SUJUVA) and the new FTA internet information service are available to the public via the website http://liikennetilanne.liikennevirasto.fi/.

The website provides traffic-information on maps. It contains incidents, travel times, weather information and webcam images. The service is also available as mobile service. The service is available in Swedish and Finnish.



3.2 Business Model

The models for distribution of data and providing traffic information are still changing dramatically.

For the future it has to be discussed how the value chain of providing traffic information could be described. There is a different focus on deploying services for the forecast and real time event information as well from private companies as from national authorities and road operators. A new approach for the future roles of the public and private partners could be defined within the Cooperative Systems.

4 Annex A: Compliance Checklist

4.1 Compliance checklist "**must**"

#	Requirement	Fulfilled?		If no – quote of insurmountable reasons
		Yes	No	
Functional requirements				
FR1	Functional decomposition into sub-functions with the provision of interfaces **must** be carried out to enable interoperability in cases that the service is carried out by more than one organisation (and functional decomposition is recommended in any case to be prepared to involve yet further parties as may be the case in the future).			
FR2	All data and information collected/signalled/generated by both automatic and non-technical sources/road operator actions **must** contain: • where applicable, a location code and • a time stamp. The geographical basis of the location code should be left to the road operator to define, anyway the model of information provision **must** respect DATEX II location reference and time stamp models.			
FR4	Source, scope and quality (based on a quality model to be defined) of data provided by content owners to content providers **must** be defined by the partners and **must** be part of data interface description.			
Functional requirement: Interfaces				
FR7	To enable interoperability between all involved parties the sub-functions data collection and data fusion and processing **must**- depending on the used data type for the automatic event detection - require/provide an interface 1 with at least one or several of the following information structures: • traffic volume and speed, occupation rate (e. g. collected by loops, radar, video…) • trajectories (travel time per itinerary e. g. collected by APNR - automatic			

	number plate recognition, video…) • travel time (e. g. collected by Taxi FCD, Navigation Systems, Phone Data, …)			
FR8	To enable interoperability between all involved parties the sub-functions data fusion and processing and information provision **must** require/provide an interface with the following event information structure (if no information is available for an element, value can be left void): • (estimated) impact on traffic situation • start and estimated end (date, time) • position (location code) and estimated spatial dimension • type, cause (optional) • comment (free text) • information source • means of information provision			
Organisational requirements				
OR1	The organisational and operational structure of the service as well as the role of each public organisation/body and its exact responsibility and task in the chain **must** be defined.			
OR2	All for successful implementation of a "Forecast and Real Time Event Information Service" necessary organisational aspects **must** be documented and agreed by all involved parties/partners to fix the co-operation.			
OR3	All necessary collaboration processes/workflows and interfaces **must** be described			
Technical requirements				
TR1	In case road operators have to exchange data requiring interoperability between two or more different organisations (data providers and service providers) involved in the forecast and real time event information value chain the corresponding DATEXII-Profiles **must** be used for **interface 1** (as defined by FR7): • Static information: measurement site information • Dynamic information - Data			

	Collection: Traffic flow • Dynamic information - Data Collection: Traffic speed (average) • Dynamic information: Traffic speed (single vehicle) • Dynamic information - Data Collection: Occupancy rate • Dynamic information - Data Collection: Trajectories (proposal to use itinerary → vehicle speed per itinerary) • Dynamic information - Data Collection: Floating car data (proposal)			
TR2	In case road operators have to exchange data requiring interoperability between two or more different organisations (data providers and service providers) involved in the forecast and real time event information value chain, the corresponding DATEX II-Profiles **must** be used for **interface 2 (**as defined by FR8)**:**			
Common Look & Feel requirements				
None				
Level of Service requirements				
None				

4.2 Compliance checklist "**should**"

#	Requirement	Fulfilled?		If no – explanation of deviation
		Yes	No	
Functional requirements				
FR3	Beneath real time data also historic data **should** also be used to generate event predictions.			
FR5	The quality of the data **should** not only be defined but **should** also be an important point of consideration.			
FR6	Beneath the means of information provision (information channels and end user devices), where applicable the area (territory) and locations of information dissemination **should** be defined in relation to the media used.			
Functional requirement: Interfaces				
None				
Organisational requirements				
OR4	The information provision **should** be in accordance with any management plans (TMP, see TMS-DG07) which are in operation of the road authorities or traffic management centres			
Technical requirements				
TR3	To enable interoperability between different organisations involved in the forecast and real time event information service the mapping of events to the relevant information provision standards TPEG, ALERT-C **should** be considered			
Common Look & Feel requirements				
CL&FR1	Information for the end user **should** always be consistent whatever media or end user device is used.			
CL&FR2	The display of signs/pictograms on VMS or other end-user devices **should** be in accordance with prevailing national road codes and where applicable be in line with the requirements of the EW-DG VMS-DG01 - VMS Message Design Principles: • MS which ratified the 1968 Convention MUST respect the 1968 Convention and SHOULD consider the Consolidated Resolution on Road			

	Signs and Signals (R.E.2); • MS which did **sign but** not ratif**y** the 1968 Convention SHOULD follow the 1968 Convention and also consider the R.E.2**.** It is up to the deploying road operator to ensure that real signs are well and widely understood by the road users.			
Level of Service requirements				
LoSR1	In case that pre-deployment surveys / evaluations provide the necessary evidence to proceed with the deployment of the ITS-service "Forecast and real time event information", the minimum and optimum LoS **should** respect the following Level of Service to Operating Environment mapping table			

4.3 Compliance checklist "**may**"

#	Requirement	Fulfilled?		If yes –remarks
		Yes	No	
Functional requirements				
None	.			
Organisational requirements				
None				
Technical requirements				
None				
Common Look & Feel requirements				
None				
Level of Service requirements				
None				

5 Annex B: Bibliography

1. **S. Bradner, (Network Working Group).** Key words for use in RFCs to Indicate Requirement Levels. *The Internet Engineering Task Force (IETF).* [Online] March 1997. http://www.ietf.org/rfc/rfc2119.txt.

2. **United Nations - Economic and Social Council.** ECE/TRANS/WP.1/119/Rev.2. [Online] 27 May 2010. http://www.unece.org/fileadmin/DAM/trans/main/wp1/wp1fdoc/ECE-TRANS-WP.1-119-Rev.2%20e.pdf.

3. **21707, Draft ISO/PDTR.***Intelligent Transport Systems – Integrated Transport Information, Management and Control – Data Quality in ITS Systems .* 30. March 2007.

6 Annex C: Endnotes

i Draft ISO/PDTR 21707 Intelligent Transport Systems – Integrated Transport Information, Management and Control – Data Quality in ITS Systems, 30. March 2007

ii http://www.verkeerscentrum.be and http://www.filebeeld.be for mobile devices