Report of the eSafety Working Group on Real-Time Traffic and Travel Information (RTTI)

Brussels, 16 March 2007

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1. *Definition & Objectives*

Accurate, reliable and on-time Traffic and Travel Information has the potential to increase the safety and efficiency of the transport system in many ways. With real-time traffic information, road users can avoid congestion and bottlenecks, select alternative routes or transport modes and avoid secondary accidents and incidents in urban areas and the motorway network. Informing the driver of the "operating conditions" of the traffic environment and the road conditions during her/his journey is the necessary complement to active and passive safety systems of the vehicle. Multiple services are in use in Europe, with various technologies. With regards to broadcasting, RDS-TMC is the only available near pan-European service, supported by the TMC Forum, and being used already by millions of drivers with fixed or mobile receivers.

Cooperation between the car industry and service providers has produced many commercial Traffic and Travel Information services for multiple platforms (in-vehicle platform, internet and mobile phones). On the side of data collection, new technologies like so called Floating-Vehicle Data (FVD) or Floating-Phone Data (FPD) are emerging as new sources for real-time traffic information, without the need to invest in road infrastructure based means of detection. Essential requirements for the establishment of RTTI services are access to the public sector data, and capability of the private and public sectors to co-operate in service provision at local, regional, national and EU levels.

The commercial sector, thereby, could be in a position to provide services in large conglomerations to leverage investments and create economies of scale. However, pan-European RTTI services and especially services providing all the necessary safety-related information with high quality, full geographic coverage and free access may require public-private partnerships to further reduce collection and processing costs. Due to different interests by stakeholders it seems to be difficult to establish business cases along the complete chain of data acquisition, evaluation and distribution composed of different stakeholders. This raises the question who would finally take the lead to bring this project forward?

This contribution focuses on real-time information for road traffic as most important contributor to mobility, where many major improvements are needed. It does not exclude the extension on other modes of transport the importance of which is expressly acknowledged.

2. *Scope - Perspectives, Requirements, and Expectations*

Users

The introduction and the development of RTTI services should be based on the specific requirements of road users, being part of the traffic information service chain.

Road users, or more generally: traffic participants, are increasingly confronted with traffic problems. The increasing growth of mobility of people and goods cannot be fully supported by only transport network investments even though a lack of investments in road infrastructure would have as a consequence increasing congestion, which occurs when demand exceeds the available capacity. Unavoidable road works and increasing probability of accidents are another growing phenomenon on many roads, especially in and around conurbations, despite many efforts of road authorities to manage the situation.

Improved information for end users can support their mobility demands. Information about current or expected congestion, road works or accidents and other obstructions can help users to make their decisions on travel routes, avoid possible delays and choose alternative transport modes. This so-called pre-trip information is already an important contribution to sustainable mobility as it helps to plan movements of people and goods which then can reach the destination in due time.

On-trip information helps to increase driver awareness of obstacles and driving risks on their itinerary. It facilitates safer driving and helps possibly to avoid problem spots by choosing different routes or switching to another transport mode if available for the trip. A well informed driver feels more comfortable and is less under stress. In order to achieve this it is important to have a well-defined approach to user awareness and service discovery.

Traffic management

Motorways, or generally "A-Class roads of the trunk road network", are the most efficient category of road networks. In order to improve traffic flow and to increase safety, most critical parts of the motorway network are equipped with dynamic traffic management such as stretch control (speed regulation, lane allocations, danger warnings), dynamic direction sign systems (re-routing traffic in case of incidents onto less loaded parts of the network), ramp metering systems (to avoid traffic flow breakdowns due to overload), temporary use of hard shoulders for running traffic (especially in built up areas).

Most of these systems are automatically controlled (in closed or open loops). Comprehensive collection of traffic data and traffic-related environmental data is needed as input for possible control strategies. These data are also used to automatically produce traffic messages in case of incidents. These messages are often enhanced by observations from police or so called 'jam busters', which are registered road users reporting their observations via mobile phone.

Most of the above mentioned systems use variable message signs to transmit information, warnings or regulations to users. The amount of content of these variable message signs is limited due to the fact that drivers are only able to perceive and understand a limited amount of information when passing at often high speeds, especially when they are not capable of reading the language (e.g. if not in native language) and/or are not familiar with the geographical environment to understand exit recommendations.

From the traffic management point of view it is of vital importance to inform drivers accordingly and thus to achieve best possible rule compliance and acceptance for regulations. Therefore, in-vehicle traffic messages in national language or easy to understand icons play an important role as they complement road side information and regulations on variable message signs. In addition to that, traffic information can be transmitted to drivers anywhere on the road network, on-trip and pre-trip. It is the best advanced possibility to influence driver behaviour, road choice and also modal choice.

With increasing market penetration of navigation systems using digitally transmitted traffic information (Radio Data System / Traffic Message Channel, RDS-TMC) to enable dynamic navigation around congestion by updating route resistances according to prevailing conditions, traffic information gains even more importance for influencing road network operation. This is a fact to be taken into account when considering improvements and necessary enhancement of traffic information services. Navigation systems tend to re-route traffic from the motorway network to the secondary road networks if events or disturbances are reported on the motorway. However, the traffic situation outside motorways and especially in urban areas is rarely monitored. Therefore, the situation on these secondary networks is more or less unknown to traffic managers. Available experience from the past, the knowledge of normal traffic loads on these secondary networks, can help to overcome the situation but cannot really solve the problem. For efficient road network operation, there is an urgent need to improve traffic monitoring in all major (strategic) road networks.

Technical requirements:

Traffic information must be based on collection of current data, backed by historical data and prediction of expected traffic relevant events. The collection of these data can only be achieved by automatic processes, standardised data transmission and standardised dictionaries. Information technologies of relevant actors have to be adjusted to each other. Procedures how to incorporate predictive information regarding expected events such as fairs, exhibitions, sport events, road works, have to be agreed upon.

To achieve sufficient coverage of the road network it is important to include vehicles and/or drivers and end users not only at the end of the information chain but also as source of information, through Floating Car / Vehicle (FCD, FVD) or Phone Data (FPD) or similar means. Technical precautions must be taken in order to avoid privacy concerns, e.g. to ensure that FVD from vehicles contributing to traffic monitoring is not used for enforcement processes or to gather information about individual vehicles or drivers.

Advanced traffic messages should satisfy the expectations of all stakeholders concerned. This includes aspects of message contents, quality, availability, and presentation to the user.

Organisational Requirements

Taking into account the end users' and the traffic managers' needs, the following requirements are given:

- improve the monitoring of traffic conditions and road related environmental conditions by exploitation of state-of-the-art and evolving technologies,
- Extend the monitoring on non equipped motorway segments,
- define a strategic network of, and possible rollout plan for, secondary roads to be included into the monitoring processes
- establish and maintain consistency between the dynamic roadside information/regulations such as Variable Message Signs, the broadcast traffic messages, and the traffic management strategies on the primary and the secondary road networks
- display traffic information to road users in a harmonised and ergonomic way, according to national, European and international criteria, making safety and traffic management related messages freely accessible, without language barriers for foreigners
  (reference also FP6 eMOTION project, http://www.emotion-project.eu/)
- Create "executive round tables" of involved actors to prepare and agree on arrangements and regulations for co-operation in traffic monitoring and traffic and mobility management. Road authorities such as the German BASt propose to lead these discussions.

The last point is considered to be the most important and most critical one. Most actors are concentrated on their own field of responsibility according to their mandates and business fields:

- national, regional and local road administrations
- police organisations
- content providers
- broadcasting organisations
- telecommunication industry
- service providers
- vehicle manufacturers

This list is not exhaustive. It shows, however, that a number of completely differently orientated actors have to agree on common procedures and regulations. The common idea for all of them should be that the provision of sustainable mobility is the precondition for their core business or they act as an important media to communicate traffic related information as part of their general customer service. By improving mobility, their main business can profit from further growth and prosperity. This, however, requires convincing some of the actors that their co-operation for improving mobility is of advantage for them.

While this report concentrates on improving traffic flow and increasing road safety, an important secondary impact also should be highlighted - less traffic congestion automatically leads to less energy/petrol consumption. The impact on road traffic emission reduction has been taken up by the eSafety workgroup called 'ICT for clean & efficient mobility'.

3. Basic Functionality and Standards – Standardisation in Europe

ISO TC204/CEN TC278 is the responsible body for the related standardisation. The following tables give the current status of RTTI related standardisation.

TMC Standards	
ISO 14819-1:2003	Traffic and Traveller Information (TTI) -- TTI messages via traffic message coding -- Part 1: **Coding protocol** for Radio Data System -- Traffic Message Channel (RDS-TMC) using ALERT-C
ISO 14819-2:2003	Traffic and Traveller Information (TTI) -- TTI messages via traffic message coding -- Part 2: **Event and information codes** for Radio Data System -- Traffic Message Channel (RDS-TMC)
ISO 14819-3:2004	Traffic and Travel Information (TTI) -- TTI messages via traffic message coding -- Part 3: **Location referencing** for ALERT-C
ISO 14819-6:2006	Traffic and Traveller Information (TTI) -- TTI messages via traffic message coding -- Part 6: **Encryption and conditional access** for the Radio Data System -- Traffic Message Channel ALERT C coding

TPEG Standards	
ISO/TS 18234-1:2006	Traffic and Travel Information (TTI) -- TTI via Transport Protocol Expert Group (TPEG) data-streams -- Part 1: **Introduction, numbering and versions**
ISO/TS 18234-2:2006	Traffic and Travel Information (TTI) -- TTI via Transport Protocol Expert Group (TPEG) data-streams -- Part 2: **Syntax, Semantics and Framing Structure (SSF)**
ISO/TS 18234-3:2006	Traffic and Travel Information (TTI) -- TTI via Transport Protocol Expert Group (TPEG) data-streams -- Part 3: **Service and Network Information (SNI)** application
ISO/TS 18234-4:2006	Traffic and Travel Information (TTI) -- TTI via Transport Protocol Expert Group (TPEG) data-streams -- Part 4: **Road Traffic Message (RTM)** application
ISO/TS 18234-5:2006	Traffic and Travel Information (TTI) -- TTI via Transport Protocol Expert Group (TPEG) data-streams -- Part 5: **Public Transport Information (PTI)** application
ISO/TS 18234-6:2006	Traffic and Travel Information (TTI) - TTI via Transport Protocol Expert Group (TPEG) data-streams -- Part 6: **Location referencing** applications
ISO/TS 24530-1:2006	Traffic and Travel Information (TTI) -- TTI via Transport Protocol Experts Group (TPEG) Extensible Markup Language (XML) -- Part 1: **Introduction, common data types and tpegML**
ISO/TS 24530-2:2006	Traffic and Travel Information (TTI) -- TTI via Transport Protocol Experts Group (TPEG) Extensible Markup Language (XML) -- Part 2: **tpeg-locML**
ISO/TS 24530-3:2006	Traffic and Travel Information (TTI) -- TTI via Transport Protocol Experts Group (TPEG) Extensible Markup Language (XML) -- Part 3: **tpeg-rtmML**
ISO/TS 24530-4:2006	Traffic and Travel Information (TTI) -- TTI via Transport Protocol Experts Group (TPEG) Extensible Markup Language (XML) -- Part 4: **tpeg-ptiML**

Location Referencing Standards	
ISO TC 204 WG3 (ISO CD 17572)	Flexible location referencing methods are under development. This aims to support accurate on-the-fly location referencing across map databases, avoiding restrictions of fixed location tables. The method is therefore relevant to expand the use of RTTI for dynamic navigation also in urban areas. Approved at ISO ballot with minor changes, expect Draft International Standard status August 2007, final Standard 2008.

4. *Current Status of TMC Implementation*

The following table describes the status of TMC implementation (as the key RTTI technology) worldwide in November 2006. TPEG development work is not yet covered in detail (first tests in Germany and Netherlands, July 2006). A number of additional countries not listed below are in the development phase working on pre-requisites and plans for the introduction of public or commercial TMC services.

Andorra	TMC implementation in process - location table created and certified. No service yet exists but one is planned and under development.
Australia	Intelematics Australia is testing a national RDS-TMC service focused initially on the main Australian cities. The service is currently in testing and calibration phase and plans to launch during 2007. The service is transmitted by a national commercial FM broadcaster.
Austria	TMC implementation complete. Österreichischer Rundfunk operates a free public TMC service which is broadcast nationwide.
Belgium	TMC implementation complete. VRT (Flanders / Brussels) and MET (Wallonia) operate free public TMC services, providing free TMC information for motorways and major roads.
Canada	TMC services are under development for Canada. Services will use FM RDS/RBDS-TMC but information is also sent using HD Radio and XM satellite radio broadcasts.
China	A live demonstration of TMC was held in Beijing in 2005 as part of the European-Chinese ITS cooperation project co-funded by the European Commission Asia IT&C Programme, DYNASTY. The Chinese authorities are currently developing their plan for implementing RTTI.
Czech Republic	TMC implementation in process - location table created and certified, successful tests in late 2003, Czech language translation of the event list completed, regular broadcasts launched in 2005, initially addressing the Prague city area and some major surrounding roads. Participant in the CONNECT Euro-Regional Project, focusing on enhancement of cross-border cooperation and sharing of Austria's experiences.
Denmark	TMC implementation complete. The Danish Road Directorate traffic information service DK-TMC provides free public TMC traffic information nationwide.
Finland	TMC implementation complete. TMC service is operated as a commercial paid service by Destia (formerly known as Finnish Road Enterprise). The service is run on a commercial basis in conjunction with specific vehicle or navigation system brands and offers national coverage. Destia uses its own fixed flow sensors and those of the Finnish Road Administration on the main road network as well as its own Floating Vehicle Data (FVD) network, supplemented with other journalistic sources which provide "cause" and other important driver information.

France	TMC implementation complete. Three TMC services available:
	• Service from autoroute companies free to users of the autoroute network, covering this network.
	• Two other commercial services from V-Traffic and ViaMichelin.
	  o V-Traffic covers 95% of France (geographic area) with 6 cells (8 in 2007) . The service covers Paris, main cities and more than 50 000 km of motorways and na-tional network
	  o ViaMichelin covers all metropolitan areas in France.

Germany	TMC implementation complete. Two TMC services available: Public free TMC services offered by a regionalised network of ten public broadcasters and some private radio stations making TMC messages available in the whole Federal Republic (100% coverage). A national commercial TMC service, TMCpro, is operated by T-Systems Traffic. Country-wide service coverage of landmass and motorways beyond 90%. Provides

	additional traffic flow data generated over an extensive network of stationary sensors mounted on German motorways and from floating car data (FCD). An advanced RTTI technical project is running. This driver information system is focused on digital radio and based on TPEG and includes precise location referencing. The project facilitates among other applications a cost effective local hazard warning function.
Hungary	There is no RDS-TMC service today in Hungary. The country is a participant in the CONNECT Euro-Regional Project. The development of an RDS-TMC system is a target within the scope of this project.
Irish Republic	There is no RDS-TMC service today in the Republic of Ireland.
Italy	TMC implementation complete / undergoing change: The national traffic information centre broadcasts a free public TMC service covering major routes in the North of the country. A free national TMC service from commercial radio station RTL has been available in Italy since April 2004, covering 90%+ of the population. This service will soon begin to operate on a commercial basis.
Malta	The Maltese authorities are currently working to address issues related to the establishment of such services. Malta is also in the process of setting up a fully fledged state of the art traffic management system, run by the Malta Transport Authority , in two stages which are to be executed over the next 24 months. The first phase will include the installation of a number of variable message signs and CCTV cameras on the main road network and connected to a central control hub, through which traffic could be monitored at all times and drivers advised accordingly. This will be implemented over the next twelve months. In the subsequent and final phase, a full Urban Traffic Control (UTC) system will be put in place to ease traffic management.
Netherlands	TMC implementation complete. There are two services, both covering all highways and major roads: TMC4U, a collaboration between Siemens and ANWB, provides a national public TMC service. Currently free; TMC4U plan an enhanced pay-service including local information. Vialis provides a national public TMC service.
Norway	TMC implementation complete / undergoing change. The Norwegian Public Roads Administration (NPRA) has established a TMC service, initially in a limited area (Østfold, Akershus and Oslo) and expanding to cover larger parts of the country.
Portugal	There is no current TMC service in Portugal. Supporting elements such as a Portuguese language event list have been created.
Slovakia	TMC implementation in process – no current service. Slovakia is a participant in the CONNECT Euro-Regional Project. A national location table and an event list translation have been used for technical test transmissions. Information collection and processing and official agreements are required.
Slovenia	There is no current TMC service in Slovenia. The country is a participant in the CONNECT Euro-Regional Project. The development of systems supporting international traffic information is a target within the scope of this project.
Spain	TMC implementation complete. The Directorate General of Traffic (DGT) gathers relevant information from different regional, non-urban traffic public administrations

	(the Catalonian Traffic Service (SCT) in Catalonia, the Directorate of Traffic (DT) in the Basque Country, and DGT elsewhere) into the Traffic Information Concentrator (CIT). ALERT-C messages are sent from DGT to the Spanish National Radio (RNE) to be broadcasted in the geographically relevant areas (specifically, via RNE-3). A free public service is provided: any vehicle with a RDS-TMC receiver will be able to decode the messages free of charge at any national and first-level conventional road or motorway.
Sweden	TMC implementation complete. The Swedish Road Administration (SRA) national free public service reaches about 98 percent of Sweden and messages cover the European-level highways, national highways and trunk roads.
Switzerland	TMC implementation complete. A nationwide TMC service is available in every part of the country and the whole road network is covered, except minor local road links. The TMC messages are generated by the national Traffic Information Centre (TIC) Viasuisse AG and broadcast by SRG-SSR idée Suisse. The most important mountain passes and border crossings have been added to the location code list, and also waiting areas for heavy goods traffic to be used when goods vehicle restrictions are in place. In addition, some inter-modal links (ferry and rail) frequently used in traffic information are included.
United Kingdom	TMC implementation complete. There are two TMC services in the UK. These are provided by ITIS (iTMC) and by Trafficmaster. Both are run on a commercial basis in conjunction with specific vehicle or navigation system brands and offer national coverage: iTMC uses ITIS's own Floating Vehicle Data (FVD) network along with other journalistic sources which provide "cause" and other important driver information. Trafficmaster's traffic information is collected via its network of fixed flow sensors on the UK Motorway and Trunk Road network, supplemented with incidental data collected in partnership with the RAC.
United States of America	TMC services are available in USA. Services use FM RDS/RBDS-TMC but information is also sent using HD Radio and XM satellite radio broadcasts. Total Traffic Network from Clear Channel uses its own network of reporters, traffic cameras, helicopters and aeroplanes to collect traffic information. The Total Traffic Network TMC service is available on a subscription basis on a wide range of products. Over 49 cities are covered (December 2006). XM NavTraffic is a nationwide satellite-based data traffic information service using the TMC standards to enable an overlay of current traffic conditions. Traffic information, aggregated by NAVTEQ Traffic, is provided via continuous satellite broadcast to an on-board vehicle navigation system. Over 44 cities are covered (December 2006). This information is also provided as an RBDS-TMC service by NAVTEQ Traffic directly.

5. Business Models

In addition to the technical setup of an RTTI service such as TMC, a good organisational and business model is essential. From the organisational point of view, the commitments and contract agreements of each interaction must be clearly defined throughout the service chain. This is the case whatever the basis for the service – public, private or mixed (public private partnership). Each of these scenarios forms a possible business / implementation model with a set of advantages and disadvantages for the safety-focused introduction of more, better RTTI services:

Implementation	Advantages	Disadvantages
Public e.g. German, Spanish national public services	• Service forms part of Government approach to improve road efficiency/safety • Free access to service (both for service provider and for user) for widest possible user base • Governmental involvement may help development of cross-border support • Consistency with other Public Authority driver information, e.g. VMS displays	• Unequal and partly limited investment in infrastructure and advertising across Europe • Improvements dependent on Public Authority support/strategy and funding • In most countries progress suffers from long planning and contracting processes. Therefore may be less nimble • May not be a market driven approach e.g. individualisatio
Private e.g. ITIS in UK, TMCPro in Germany	• Private funding can support investment in advanced data collection and processing • Private companies motivated to make service good enough to convince customer (both user and OEM) to pay through Conditional Access – for example with coverage, added features or personalisation • 'Self-funded' i.e. doesn't require public expenditure	• Cost deters some hardware makers → reduced accessibility for users if not in parallel with free service • Potentially smaller user base reduces public safety and efficiency benefits by creating a 'two-class' traffic information environment • Business case may focus on major cities / routes and not national coverage • May be harder to find bandwidth for broadcast due to commercial arrangements required • May require roaming agreements
Mixed (Public Private Partnership)	• Private data can be sourced to support service quality (e.g. multiple sources) while maintaining Government control over service scope and quality	• Cost of private service chain components must be compensated • Potential conflict between aims of public and private stakeholders if agreements not clearly defined

In order to offer a private service, the service provider uses the Conditional Access mechanism, as defined in CEN / ISO standard 14819-6 referenced in Section 3 of this document, to limit access to those navigation systems where the manufacturer has an agreement with the service provider. Charging is not normally passed on to the end customer but is included in the price of the hardware. The Conditional Access mechanism supports lifetime service access on a per-product basis rather than annual subscriptions on a per-customer basis.

One approach meeting the market needs and public-private-partnership can be that traffic and travel information collected by public authorities (directly or by financing the data collection) is available for free for all possible service providers (such as in Finland).

Basic business case structures - examples

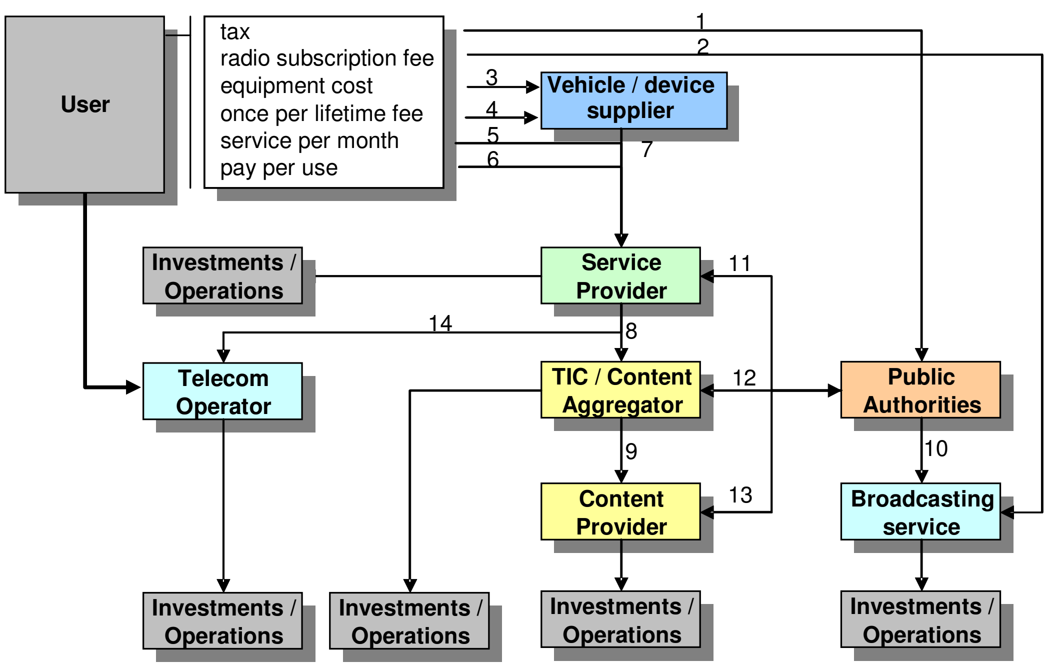


Fig: Cash flow dependencies for traffic and traveller information service (TTI)

1	TTI "free", as public service user paid via tax (internet, radio)
2	TTI included in broadcasting service fee (RDS/TMC via FM, DAB)
3	TTI included in purchase of equipment (radio, navigation system)
4	TTI included once-per-lifetime (purchase of car, radio, navigation system)
5	TTI as subscription service (Automobile Club, service provider)
6	TTI pay-per-use (toll-number)
7	Manufacturer pays service provider for end user service (subscription)
8	Service provider pays traffic information center (TIC) for TTI
9	Traffic information center pays Content Provider(s) for data
10	Public Authorities co-finance broadcasting infrastructure TTI (FM, DAB)
11	Public Authorities (co-)finance private service provider(s)
12	Public Authorities (co-)finance TIC and use TTI for their own Traffic Management responsibilities
13	Public Authorities (co-)finance content gathering
14	Service providers pay telco's for delivery of TTI to their customers
other	Each party has to finance their investments and operations.

Value chain

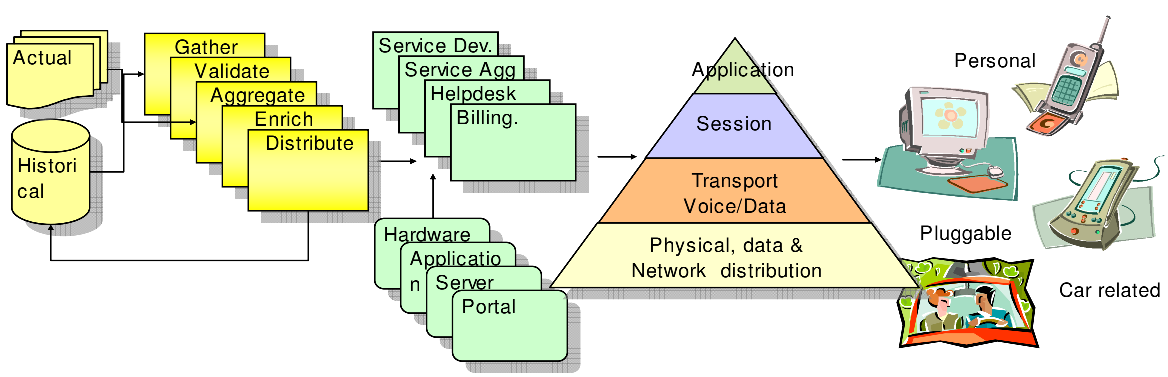
Depending on the vision of the Public Authorities on their role and the number of actors different business models can be derived.

In each model the choices in the division of tasks, responsibilities and competencies; the chosen organisation form; the division of costs, profit and risks differ.

The end-user is more willing to pay directly if the service is personalized, location based and real-time.

For each mobility information service a value chain can be composed, therefore we divide the value chain into four *platforms*. Within each platform a number of *functions* can be defined e.g.:

Content Platform	Service Platform	Distribution Platform	Delivery Platform
Data collection	Service development	Infrastructure provider	Owner centric applications
Data validation	Service aggregation	Access network provider	User centric applications
Content aggregation	Customer care, helpdesk	Communication provider	Car centric applications
Content enrichment	Billing	Service provider	Equipment service
Content provision	Application portal, server	Retail service provider	Vehicle integration
Content storage	Application service provision		



For each function a set of roles apply (*design, build, finance, own, exploit, maintain, manage*), and each function has its suppliers and clients. Different actors have their activities on a certain cluster of roles and functions. Also a number of functions (like tests, life-cycle management) have to be harmonized through the complete value chain.

6. *Proposals for "Minimum of free traffic updates"*

The concept of a minimum set of important messages is a controversial one. Different sectors of the service chain, public authorities, commercial service providers etc. all have slightly different views of which traffic messages are most important. There is a basic understanding that each meaningful message may be safety related as it reduces uncertainty and thus eliminates a source of potential stress for the driver. But, for example, the same message might be "safety-related" if received by drivers immediately approaching an incident or may be just "informative" for drivers still far away. Further, the ownership of gathered data and the further processing of data, eventually combined with specific, value-adding knowledge-bases, may create needs for specific arrangements of business models and responsibilities. Therefore Member States will have to establish solutions based on their given conditions and that the European Commission will have to take necessary steps to co-ordinate the cross-border flow of information (Recommendations 1, 3).

Example: Minimum set free of free traffic updates as supported unanimously by the members of the German Traffic Information Platform (AG TMC-VID, March 2006):

Level	Hazard prevention	Event examples
I	+++++	High-risk situations, e.g. "Wrong-way drivers"
II	++++	High-risk situations, e.g. "People, animals, or foreign objects on the road"
III	+++	Disruptions, e.g. "Road closure"
IV	+++	Disruptions, e.g. "Standstill"
V	+++	Disruptions, e.g. "Slow-moving traffic"
VI	++	Restoring normal traffic flow by cutting delays
VII	+	Maintaining smooth traffic flows with a view to lessening the economic impact

Technical aspects about "free" and "encrypted" information content:

RDS-TMC

Existing implementations of the standards enable either un-encrypted ("freely accessible") or encrypted ("conditionally accessible") messages in one channel, mixtures of both are practically not feasible with today's receivers, though standards would allow it. Analogue broadcasting (FM) has to use different radio channels to transmit both types of service.

TPEG

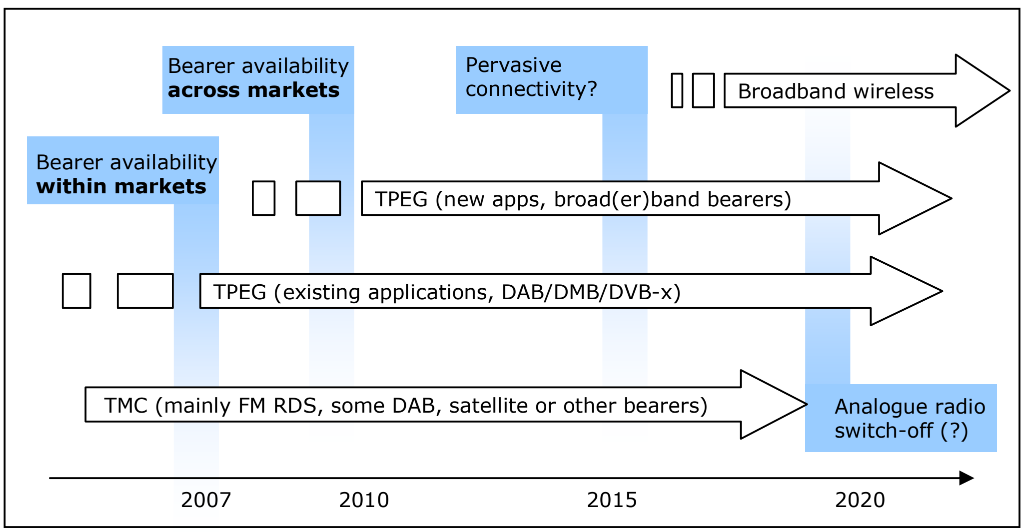
The standard is applicable with digital broadcasting media and will provide high flexibility for different access modes: un-encrypted data, encrypted data, and co-existence of both in the same data channel. The content can be transmitted as data associated with one programme (PAD) or as non-programme associated data (NPAD). The standard allows the use of different encryption and transmission modes related to different contents (e.g. safety related and value added information).

7. *Recommendations for Implementation Path*

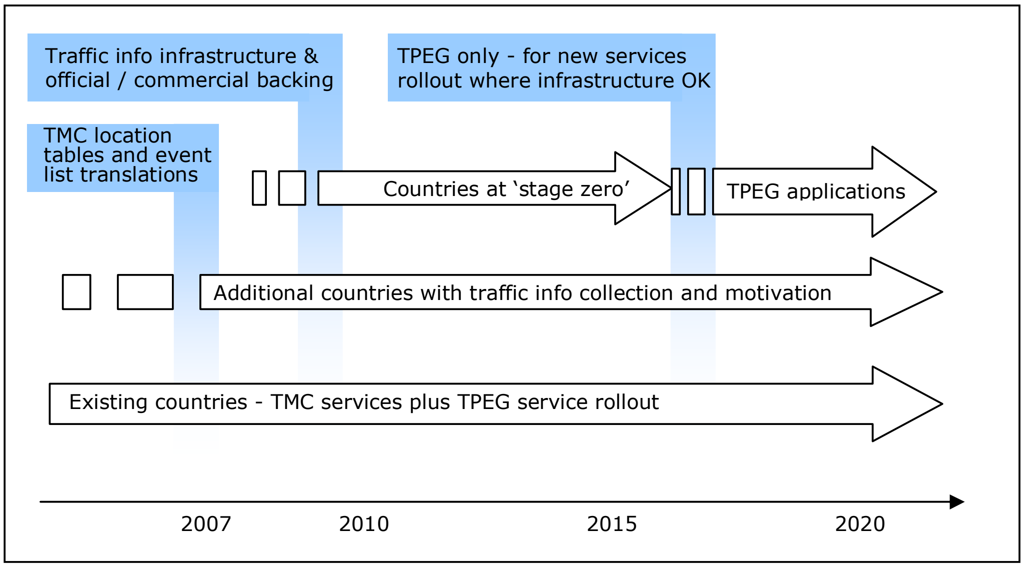
In addition to technical and business model development, an important consideration is how to gain Governmental and other official organisation support for service implementation. Demonstrations can offer a valuable tool for convincing officials of the potential benefits – but are time consuming to prepare, especially if implementing the whole business chain live. Visits to countries with working TMC services can also be effective – perhaps combining a visit for carefully-targeted officials to a traffic information centre with a demonstration drive in a TMC-equipped vehicle. Experts in the field, through the TMC Forum or alike could also provide help to analyse the local situation and highlight key development tasks and possible 'roadblocks' to implementation.

The following diagrams describe a high-level view of potential road maps for the various aspects involved.

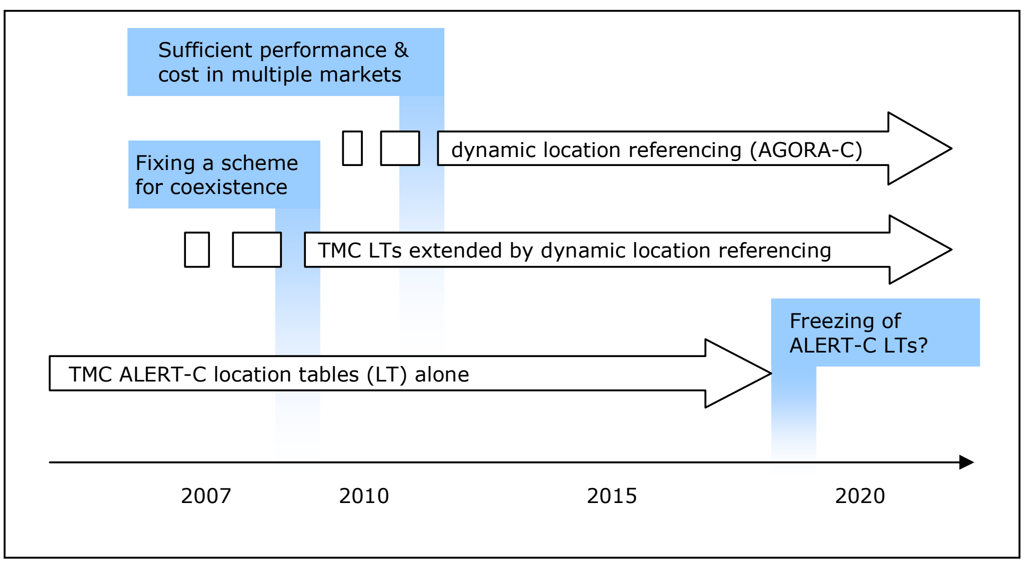
Traffic Information Protocols / bearers



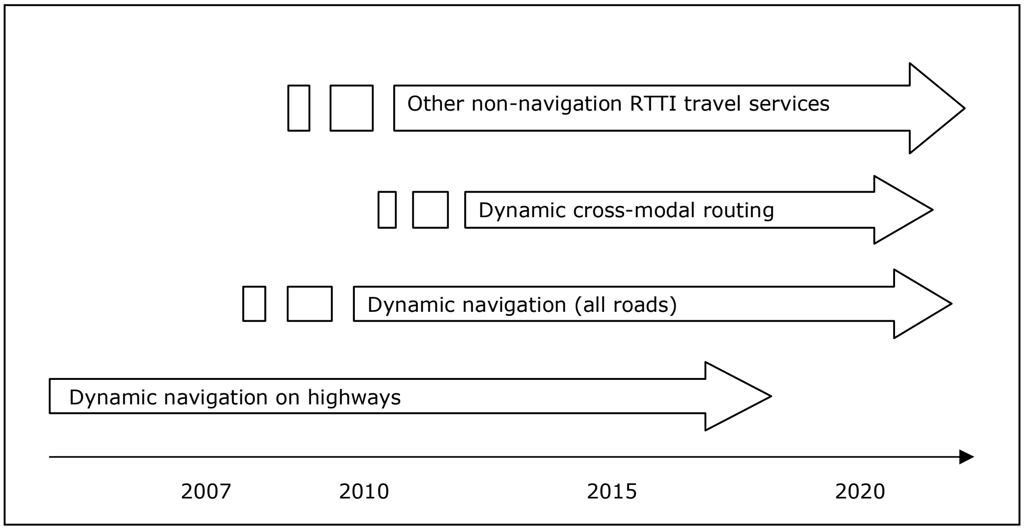
TMC Rollout in new markets



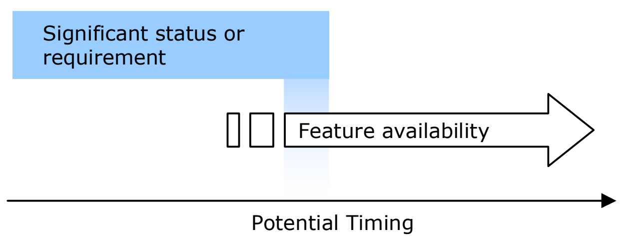
Location Referencing



RTTI Applications



Key to Road Map Diagrams



Glossary

3G	'3rd Generation' / Universal Mobile Telecommunications System (UMTS) mobile telephone services, characterized by high performance and high bandwidth data services
AGORA-C	Flexible on-the-fly (doesn't need pre-encoded locations) location referencing method
ALERT-C	Traffic information encoding used for TMC messages – uses pre-encoded event description and location reference, decoded in the receiver using look-up tables
DAB	Digital Audio Broadcast – digital method of broadcasting, offering higher data capacity than FM radio channels
DRM	Digital Radio Mondial – digital audio broadcasting for AM broadcast, which can fit more channels than AM, at higher quality, into a given amount of bandwidth
DVB-T	Digital Video Broadcast – Terrestrial – method of broadcasting audio, video and other data as already used for terrestrial digital television broadcast
FPD	Floating Phone Data – as FVD but monitoring the location of mobile telephones – can be performed at GSM network level without requiring special hardware in the telephone or vehicle
FVD, FCD	Floating Vehicle (Car) Data – monitoring the locations and movements of a set of vehicles, such as through collecting locations regularly using GPS devices mounted in a fleet of vehicles, and using the data (usually anonymised) to understand more about the overall road conditions and congestion
RDS-TMC, TMC	Radio Data System Traffic Message Channel - a method of sending traffic information as silent messages alongside regular radio broadcasts, optimised for FM broadcast and typically received by compatible satellite navigation systems and used for driver information and dynamic navigation (rerouting). TMC is an ODA (Open Data Application) built upon RDS
RBDS	North American standard for FM radio data. Very closely related to RDS, but with some small differences which must be taken into account when implementing TMC or other data services
(R)TTI	(Real-time) Traffic and Travel Information
Telematics	Telematics is a combination of the subjects "telecommunications" and "informatics". "Transport telematics" is the application of telematics on the whole field of transport and is the basis for "Intelligent Transport Systems (ITS)"
TPEG	Transport Protocol Expert Group – Method of encoding and sending traffic and travel information as silent messages alongside regular radio broadcasts, optimised for DAB broadcast but also applicable to other digital bearers; requires more bandwidth than TMC but can exploit this bandwidth with more / richer services
WLAN	Wireless Local Area Networks or 'wifi' – standards for wireless computer networking such as 802.11x standards series