Position Paper

The Traveller Information Services Association (TISA) is a market-driven membership association with worldwide scope, established as a non-profit company focussed on proactive implementation of traffic and travel information services and products based on existing standards, including primarily RDS-TMC and TPEG technologies.

TISA's mission is to develop and promote open standards and policies that

- facilitate a timely and cost-effective deployment of TTI services and products that save end users time and money, increase traffic safety, and minimize environmental impact
- improve the quality and minimize the cost of such services and products by maximizing interoperability worldwide

With this Position Paper, TISA wishes to provide advisory information to all concerned with Traffic and Travel Information services and products. It represents the consensus opinion of all TISA membership organisations in areas of business and technology.

TISA Position

concerning a public consultation of the European Commission on the

Provision of EU-wide multimodal travel information services

(Priority Action A)

1 Introduction

TISA is developing and maintaining two of the most widespread protocols for the dissemination of traffic (and related) information: TMC and TPEG. However, both standards have a strong focus on road traffic. It is further worth mentioning that both standards are truly global, with widespread deployments around the world (see [1] and [2]), nurturing a multi-million Euro business of many stakeholders, ranging from small, specialized consulting and development firms to global corporations.

With respect to multimodal travel, TISA already made an attempt with the standardization of the Public Transport Application TPEG1-PTI [3], which as a whole however was too complex to find its way into practical applications. Currently, TISA is starting the development of TPEG2-SPT (Shared Passenger Transport), which will be the first of a modular and scalable set of applications for multimodal travel information.

Generally, one can observe that travelling is affected by road traffic and vice-versa:

> Traffic incidents, congestions, roadworks, etc. have an impact on travel times of buses, taxis or trams as well as on car sharing or carpool vehicles – all of them moving together with the other road traffic[1]. Even bicycles are to some extent affected.
>
> Transport systems not moving on roads (trains, ships, flights, etc.) influence road traffic, since connecting services (buses, trams, taxis, etc.) are often synchronized to them. Likewise can delays in road traffic propagate into non-road-bound transport modes via synchronisation of servcies.

TISA recognizes the important role of multi-modal traveling in a viable solution to solve the *transportation puzzle*. The topic has therefore been placed as a high-priority item on the strategic roadmap of TISA for the short- to mid-term future. This position paper outlines, based on over 18 years of experience in the road traffic information business, some thoughts on how to approach the multifaceted problem of multimodal transportation. It further points out the areas which are relevant to TISA and the business interests of its members.

[1] There may be situations, where dedicated bus lanes or carpool lanes allow these vehicles to bypass traffic congestions. This is however considered as a *local mitigation* and not as a *general solution* to the problem.

2 DEFINITIONS

Access point	is a central point where data and/or meta-information about data can be found.
Cross-border Travel	means traveling between two countries *Note: Important in the context of this paper is that accessing one national access point does not suffice for completing such a journey.*
Intermodal Travel	is the process of carrying out a journey that includes at least one change of transport mode. A fundamental characteristic of Intermodal Travel is therefore that it involves at least two modes of transportation.
Local Travel	means traveling within a limited region (e.g. based on geographical, political or administrative subdivision of a country). *Note: The actual setup and segmentation is at the discretion of the country itself, i.e. a country may or may not have local access points. One possible reason for having several local access points can be to limit the overall amount of data to be handled by a single access point.*
Long-distance Travel	means traveling within a country *Note: Important in the context of this paper is that accessing only one national access point may be sufficient for completing such a journey.*
Mobile Device	is a device with data connection (typically mobile Internet, but can also be digital broadcast), which can process and display information (e.g. a mobile phone, smartwatch, tablet computer, or notebook PC).
Mono-modal Travel	is the process of making a journey that does not include a change of transport mode. A fundamental constraint of Mono-modal Travel is therefore that it involves only one mode of transportation.
Multimodal Travel Planning	is commonly understood as a i) comparative search of different travel options for a given journey ii) combination of different travel modes in a plan for a given journey iii) combination of i) and ii) In the context of this position paper, we use interpretation i), which means that several travel options are compared, even if the actual journey involves no mode change. A fundamental constraint of Multimodal Travel Planning is therefore that it considers at least two modes of transportation. However, it may result in a Mono-modal journey.
Navigation Devices	is a device (as part of a vehicle, fixed within the vehicle, or portable) with built-in positioning (e.g. GPS) that can perform route calculation/optimisation and map matching and thus interactively guide the user from start to destination.
Point of Interest	is a significant and recognisable location, such as a bus stop, train station, parking space, rental car pickup or drop-off, hotel, restaurant, tourist attraction etc. which can be referenced on a digital map.
Road Traffic Information	is information related to motorised road traffic (cars, motorbikes, trucks, busses, taxis, etc.). *Note that other modes, such as air transport, ferries or trains are excluded when the term Road Traffic Information is used in this position paper.*

Service Directory	is a central point where references ("pointers") to services and related meta-information about the services can be found.
Travel Information	is an itinerary of time, location, route, stops/stations, timetables, Point of Interests etc. concerning at least one mode of transportation. Travel Information may include Road Traffic Information.

3 Current Situation in Europe with Respect to the Information of Travellers

Travellers face a multitude of differently designed information platforms that may or may not combine different transport modes. Sometimes, such platforms are limited to a given city or region, targeting mainly Local Travel. In other cases, there are country-wide platforms that may include some, but typically not all available transport modes in a given region.

Information about different transport modes does not propagate easily between different travel information service platforms: airlines usually provide real-time information about their flights, but no information about train connections after landing at the destination airport (and real-time traffic information thereof). Rail operators often provide real-time information about their trains, but no information about parking capacity and availability at P&R parking spaces co-located with their train stops; navigation devices (in-car, PNDs, navigation apps on smartphones) often provide information about public transport (train, tram or bus stops, railway stations, airports, etc.), but no real-time information about possible connections and departure times.

Cross-border or Long-distance Travel typically requires the use of at least three different platforms: for the trip origin (Local), then when travelling between start and destination (Cross-border/Long-distance) and at the destination (Local). Sophisticated integrators, which aggregate different travel data into one multimodal travel service solution, such as HERE (FI), Moovel (DE), Resrobot (SE), Journey (FI), Verkehrspilot (AT) may cover all transportation modes in a regional context, or even provide nationwide coverage. However, there is currently no service offering, which sufficiently covers also Cross-border Travel and Local Travel in other countries. On the other hand do integrators with multi-national scope, such as Google (US), often lack local coverage with sufficient detail.

4 TISA Vision

TISA expects that Road Traffic Information will soon be easily accessible across Europe at central Access Points (cf. Priority Action B and C) and encoded by content providers in a standardised protocol so that service providers can easily access such information and incorporate it in their services.

Note: With respect to the provisioning of Road Traffic Information services to end users, a number of providers already offer full-coverage services across Europe. This is therefore no longer a vision, but reality.

TISA envisages a future, where multimodal Travel Information is in the same way made accessible at central Access Points across Europe.

With respect to the distribution of such multimodal Travel Information services to end users, TISA sees a great potential for TPEG. Future extensions of the current TPEG protocol suite can cover a large part of multimodal Travel Information as outlined in Priority Action A, providing a flexible and scalable solution that

- has already been adopted across the entire navigation industry worldwide
- can be easily processed by Navigation Devices and compiled into route planning across different transport modes according to the needs of the end user (e.g. "fastest route", "cheapest route", "scenic route", "no underground transportation", or "shortest walking")

- supports different types of device (ranging from small pager-like receivers relying on broadcast information all the way to high-end devices with mobile Internet and ample supplies of memory and processing power)
- can be carried over different communication bearers
- facilitates scenarios for gradual scaling-up scenarios, where service offerings and business can grow over time

Considering the above properties, TPEG can contribute to opening an ecosystem for multimodal Travel Information services, whereby providers can tailor the scope of their services to their business models (e.g. as a regional, national, or international service provider). TISA does not foresee a need for one single platform. On the contrary, single platform solutions are rather seen as a threat to competition and customer-orientation as they could potentially result in the monopolisation of markets. TISA instead advocates open markets, where devices manufacturers, app programmers and service providers compete on fair and equal terms based on open (i.e. standardised) protocols and interfaces.

5 Conceptual Models

This section outlines three different models of how multimodal Travel Information services can be implemented. These models are not mutually exclusive, i.e. two of the models or even all three may coexist in a given market.

Note that in all three models, transport services providers may at the same time be travel service providers, providing Multi-modal Travel Planning that includes other transport modes, for which data is obtained from Access Points.

Model 1: "Central Route Planners using data from Access Points"

This model features a number of Access Points, where service providers can pick up their data and provide to their customers multimodal Travel Information service for Local Travel, Long-distance Travel or Cross-border Travel (see Figure 1).

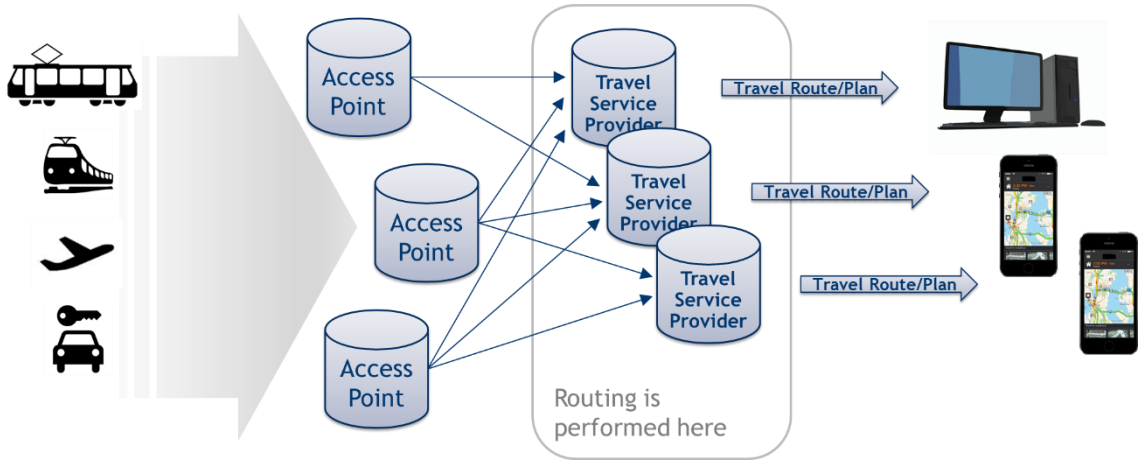

Figure 1: Model 1 – "Central Route Planners using data from Access Points"

Model 2: "Linking Services across borders"

Model 2 features predominantly multimodal travel service providers for Local Travel and/or Long-Distance Travel. For Cross-border Travel, these service providers cooperate by exchanging pre-calculated routes or travel plans to ensure seamless travel across borders for their customers (see Figure 2).

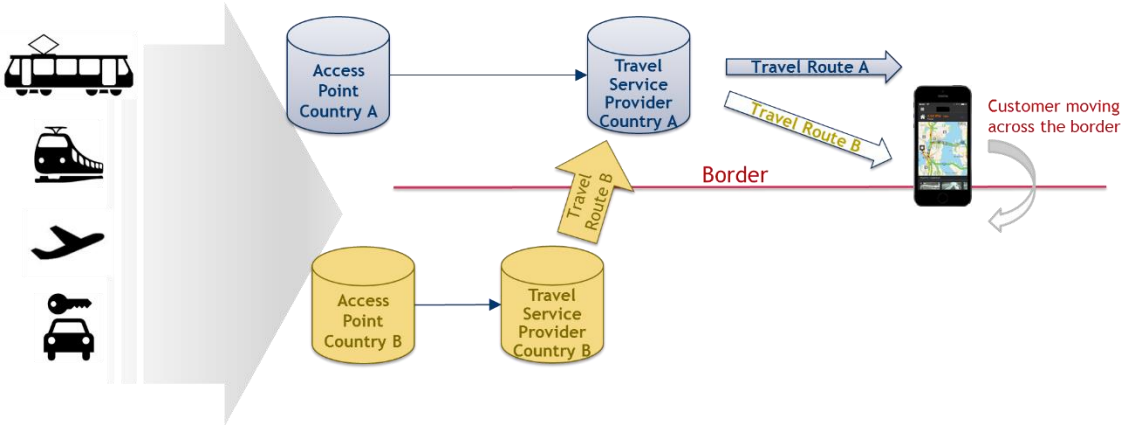

Figure 2: Model 2 – "Linking Services across borders"

Model 3: "Distributed Route Planners using data from Access Points via Service Providers"

In Model 3, multimodal routes or travel plans are calculated on Navigation Devices in a decentralised way, using multimodal Travel Information and Road Traffic Information that is provided by service providers, who in turn obtain the required multimodal Travel Information[2] from a variety of Access Points (see Figure 3).

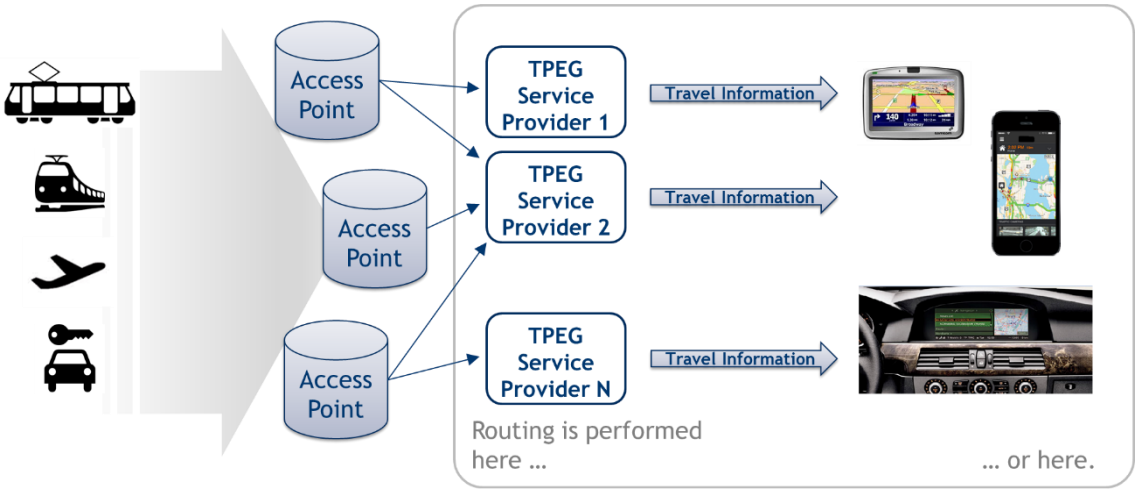

Figure 3: Model 3 – "Distributed Route Planners using data from Access Points via Service Providers"

[2] This model assumes that Road Traffic Information is readily available to these service providers (cf. Section 4 "TISA Vision" – *Note* on Road Traffic Information)

6 SCOPE

TISA frequently refers to a value chain as shown in Figure 4 for the clarification of roles, responsibilities and collaborations of different stakeholders. For further information on the TISA value chain, please refer to [4].

TISA and its members are mainly concerned with the *Service* part of this value chain. The considerations and recommendation in the following sections therefore focus mainly on this *Service* part. However, TISA still sees a clear benefit of harmonisation also in the *Content* part of the value chain. In the same way that TISA liaises with relevant stakeholders and developments in the Content part for Road Traffic Information (e.g. DATEX II), TISA foresees also a close collaboration with any organisation that coordinates the harmonisation of the Content part in the value chain for Travel Information.

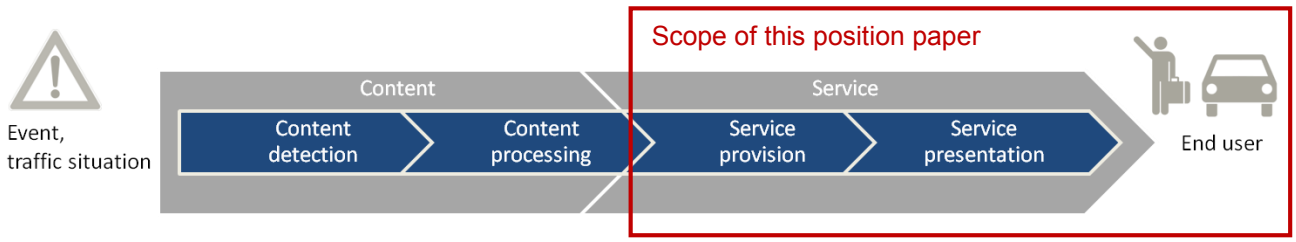

Figure 4: Basic value chain

For demonstrating how the conceptual models described in Section 5 play out on the value chain and for supporting the conclusions and recommendations of TISA in the following sections, the basic value chain in Figure 4 was expanded into an enhanced value chain shown in Figure 5. A scaled-down version of the basic value chain is added as a reference (cf. small insert at the top) to indicate the division between Content and Service part in the enhanced value chain.

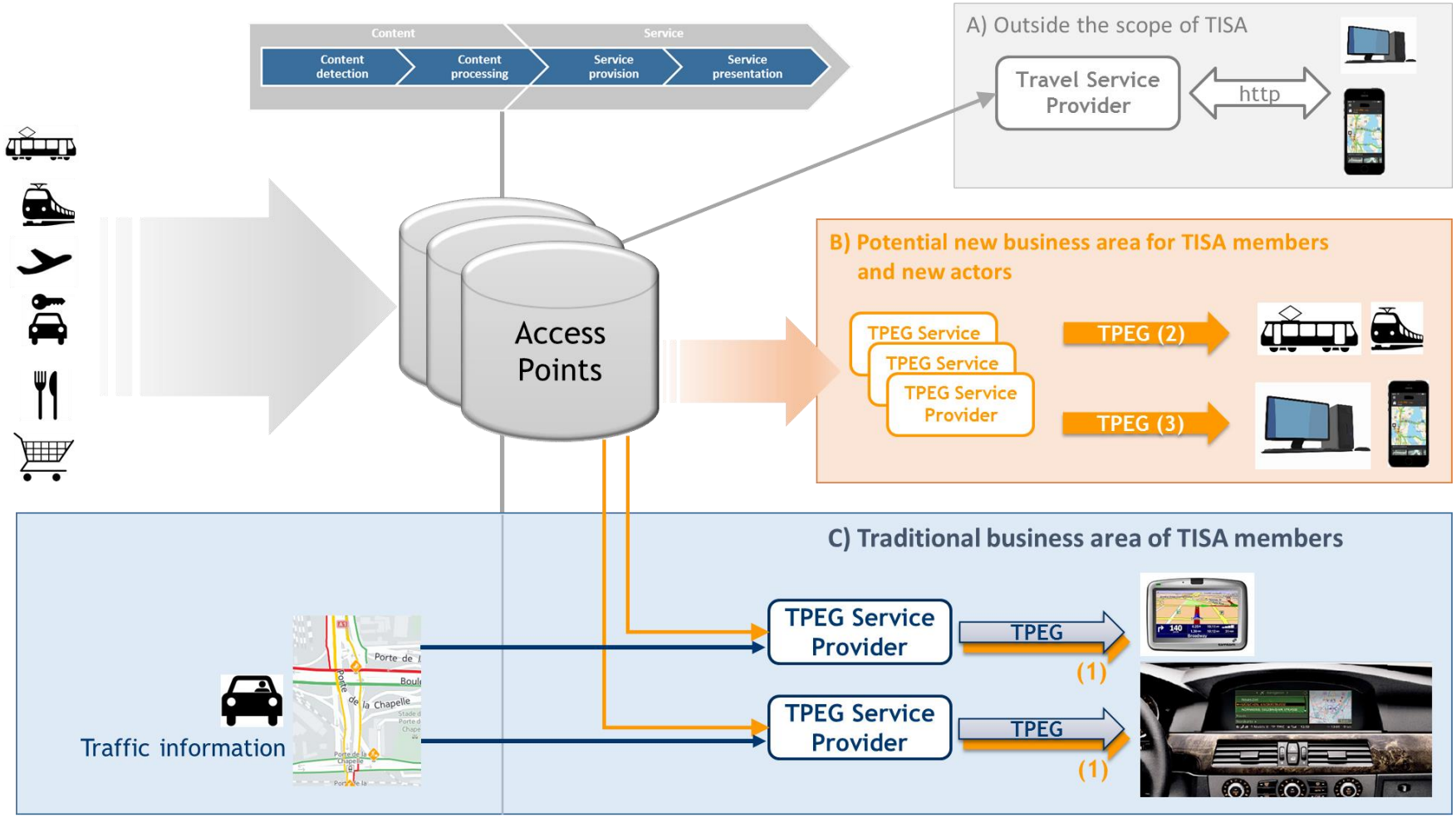

Figure 5: Enhanced value chain including multimodal traveller information

The enhanced value chain in Figure 5 shows three distinct areas, marked with the letters A, B and C and highlighted in different colour shading.

(A) In this area, TISA does not see added value of using TPEG based technology.
(top right, grey shaded)

This will likely be the domain for mobile apps and web-based services, where standardisation is of little or no benefit due to fast-moving business models as well as quick development cycles and deployment times. Local routing (*on spot*) can be performed on the user devices (PCs, Mobile Devices), based on the pre-calculated routing advice. Pre-trip planning can be performed via websites provided by travel service providers.

Area (A) will therefore not be discussed further in Section 7 about the future strategy of TISA.

(B) In this area, TPEG can contribute to a harmonisation of markets by means of standardisation.
(middle right, shaded in orange)

TPEG encoded dynamic multimodal Travel Information can be transmitted to feed on-board or on-platform information systems in public transport. It can also be provided to mobile or stationary devices.

(C) In this area, TPEG services are now used and TISA members traditionally perform their business.
(bottom, blue shaded)

Routing is performed inside the Navigation Device (sometimes perhaps assisted by centrally pre-calculated routes). Routing becomes multimodal through suitable extensions of existing TPEG services.

Model (A) is the traditional “query & central route calculation” model that most of the web-based traveller services offer.

With respect to (B) and (C), TISA does not aim to define any sort of platform, but instead encourages the development of a set of protocols that allow service providers to encode Travel Information for different transport modes in a way that is compatible with a multitude of Mobile and Navigation devices, facilitating competition and open markets.

TISA further emphasizes the need for **global** standards, as Travel Information services cannot be limited to the European market only.

7 TISA FUTURE STRATEGY AND THE ROLE OF MULTIMODAL TRAVEL INFORMATION IN THIS STRATEGY

Area (C) in Figure 5 is at the focus of attention for TISA and its members. **Here, TISA sees a great potential for building Travel Information services on top of a global base of already operational TPEG services, which can be gradually enhanced to contain more and more multimodal Travel Information (evolutionary path).** This is represented by the data flows (1) in Figure 5. With this approach, a large existing device population can readily be addressed. Multimodal Travel Information reaches the motorised traveller (individual traffic), where it can have a large societal benefit in encouraging the intelligent use of public transport by advertising e.g. interchange or P&R options. Business cases within area (C) are part of the TISA strategic roadmap and currently discussed extensively among its members.

In area (B), well-proven TPEG technology can be used for broadcasting of real-time multimodal Travel Information to stationary information terminals (e.g. on station platforms) or to mobile information terminals (e.g. in trains, buses, taxis, subways or trams), represented by data flow (2) in Figure 5. Likewise, such infor-

mation can be distributed to PCs or Mobile Devices, represented by data flow (3) in Figure 5

Generally, the dissemination of real-time multimodal Travel Information to Mobile or Navigation Devices that calculate their route locally (i.e. on the device) does not require a continuous internet connection. Occasional updates suffice and digital broadcasting solutions can be applied with great advantage here.

8 TISA Recommendation

With respect to the three conceptual models outlined in Section 5, TISA would like to express the following viewpoints:

Model 1: "Central Route Planners using data from Access Point"

TISA sees a benefit in this model. However, as TISA and its members will likely not become active stakeholders in this model, no recommendation is given.

Model 2: "Linking Services across borders"

TISA considers this model to be a rather complex solution particularly for Cross-border Travel. The required number of handover points may be very high, or if the number of handover points is chosen too small, the resulting routing may be suboptimal. However, this model may serve Local and Long-distance Travel quite well.

Model 3: "Distributed Route Planners using data from Access Points via Service Providers"

TISA recommends an evolutionary approach, where existing standards and services are expanded to step-by-step to cover more transport modes, geographical areas and requirements of travellers.

Further, TISA supports the concept of national Access Points and recommends to implement it as Service Directories, cross-referenced and possibly in the following structure:

- multinational (e.g. EU wide) for Cross-border Travel (e.g. air travel, long-distance trains)
- nationwide to support long-distance travel (e.g. trains, inter-city coaches, car rental)
- regional for local travel (e.g. commuter train, subway, city buses, tram, car sharing, carpooling, taxi)

A *one-stop-shop* is unlikely to work for implementing European-wide multimodal Travel Information services, as a rollout has to happen step-by-step at regional and national levels first. TISA also recommends to use existing, global standards and expand these to cover the needs of multimodal travel. TPEG is the preferred choice of TISA in this context.

TISA further sees a clear benefit for standards also in the Content part of the value chain for multimodal Travel Information, like DATEX II now represents a widely accepted and used standard for content encoding of Road Traffic Information.

Annex A: Additional Considerations about Privacy and Safety

There are two principles to be considered in the definition of multimodal Travel Information protocols:

Privacy

For customised travel services, data privacy and protection is an issue to be considered in the design of the service and the underlying protocols. For managing traveller flows, the public sector is interested to know how many travellers aim for the same destination. This information is privacy-sensitive and national or supra-national (e.g. EU) data privacy regulations do apply. This means that specific precautions will be needed to guarantee the privacy of individual travellers. These precautions may affect the protocols for customized travel services. On the other hand should the exchange of multimodal travel data not hampered be inappropriate precautions. TISA would like to bring this issue to the attention of the reader. TISA Members are aware of the implications and will assure privacy and compliance to the national regulations (in Europe: compliance with EU regulations) when entering the business of multimodal Travel Information.

Safety

Multimodal Travel Information for drivers is safety critical. The distraction caused by showing extensive timetables and scrolling through such lists while driving must be avoided to be compliant with applicable regulations, e.g. the European Statement of Principle for Human Machine Interfaces. TISA members are already dealing with this topic, as they have several years of experience with presenting Road Traffic Information to drivers. TISA therefore considers its members as well positioned to provide HMI solutions also for multimodal Travel Information that comply with regulations, support the business models of service providers and device manufacturers and are appealing to the end user.

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[4] EO12013 Terms and Definitions for the Traffic and Travel Information Value Chain (EO12013_TISA_Definition ITS value chain_20121018), accessible at www.tisa.org under Newsroom / Supplementary Documents