A STATE OF THE ART SURVEY ON PASSENGER INTER-MODALITY: FP5, FP6 AND FP7 PROJECTS IN "OVERVIEW OF EC POLICY"

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Summary: In this paper, presented is a State of the Art Survey on passenger inter-modality, where the main focus is on the EC policy in this sector. A number of projects and commissioned studies being conducted within FP5, FP6 and FP7are reviewed. More specifically, for the purposes of this discussion, the objectives, scope-of-work as well as expected results in terms of each reviewed project/study are regarded. We wrap up this paper with conclusions and further perspectives.

1. Overview of the EC Policy with regard to Intermodal Passenger Transport

The European Commission has identified that European transport currently finds itself in a difficult situation. Roughly speaking, the European citizens have unsatisfactory access to quality transport systems capable of meeting their needs. Advocated in the EC White Paper "*European transport policy for 2010*: time to decide", is that: Intermodal transport networks should allow for seamless intermodal passenger transportation to provide attractive alternatives to 'car-only' travel. In this respect intermodal travel chains may comprise all transport modes including walking, public transport, cycling and car use. An efficient organisation of intermodal travel would reduce the reliance on the private car and allow for the use of more environmentally friendly modes to the benefit of all European citizens and the environment. Thus, intermodal passenger transport is encouraged.

However, there are a number of barriers for seamless passenger inter-modalities seen in: unapt ticketing schemes and booking procedures; lack of standardization at all service levels; management and organizational structures are not coordinated at

National and European levels; lack of understanding of the passenger inter-modality, a lot of complexity; lack of seamless trans-boarding services at the intermodal terminals associated with unclear information and interfaces and hence accumulation of waiting times, passenger tediousness and dissatisfaction. All these barriers make the intermodal passenger transport less attractive to the traveller which may lead to a worrying decline.

In brief the intermodal passenger travel in Europe is aimed to be Seamless Door-to Door travel using several transport modes (According to specific real cases the most optimal and effective transport modes). To make it happen, basic needs for travel must be satisfied. As presented by Muller (2008), these needs are seen in:

- More **efficient** travel;
  - Better use of saturated capacities especially road and air;
  - Road congestion costs in the EU amounts to about 1% of GDP (~120 billion €).
- **Safer** travel - Still 43,000 road deaths (EU 27, 2006);
- **Cleaner** travel;
  - CO_2 emissions from transport + 32% (1990-2005), 73% of the total from road transport;
  - If nothing is done, a further increase of + 15% (2005-20).
- More **comfortable** travel - Accessibility for persons with reduced mobility /disabled.

Thus, the Transport Policy Umbrella is to encompass and encourage:
- » High level of mobility;
- » Environmental protection, energy security;
- » Innovations for efficiency and sustainability;
- » International connection (beyond EU);
- » Co-modality:
  - 1. Optimise each mode (clean & efficient)
  - 2. Integrate modes for seamless transport (inter-modality)
  - 3. Modal shift (long-distance, urban areas, congested corridors)
  - 4. Intermodal terminals, multi-modal trip planners, seamless connections urban-interurban etc.

More specifically, actions are to be further taken to:
- Improve passenger terminal access;
- Decongest passenger terminals;
- Integrate ticketing systems;

- ➢ Optimise the use of all the various modes of transport and organise co-modality between the different modes of collective transport in urban and suburban areas;
- ➢ Evaluate and optimize the performances of Intermodal terminals, multi-modal trip planners, seamless connections at urban-interurban levels, etc;
- ➢ Indentify and exchange of Best practice on integration of modes;
- ➢ Study and improve the integrated traveller information and payment/ticketing systems;
- ➢ Analyse and specify the passenger rights for public transport;
- ➢ Identify and suggest funding measures (including structural funds);
- ➢ Develop, improve and implement Intelligence in Intermodal Passenger Transport Systems (real time traffic management systems, real time travel information as well as real time safety and security during the intermodal journey;
- ➢ Education, Training/Qualification and Promotion of Top Professionals to manage and operate the inter-modal passenger services.

In the shape of Projects and Commissioned Studies under its Framework Programmes, the European Commission has been addressing a number of the foregoing actions in terms of Passenger Inter-modality. Projects and studies of significant interest to the European Commission paving the way for the Seamless Door-to Door travel using several transport modes are regarded as follows:

a. **CIVITAS** – Inter-modality in urban areas (various, 2002 - 2009);
b. **Towards European Passenger Inter-modality** (2004);
c. **MODAIR** - Measure and development of inter-modality at airports (2005 - 2006);
d. **Air and Rail Competition and Complementarity** (2006);
e. **eMotion** - Europe-wide multi-modal on-trip information (2006 - 2008);
f. **LINK** - The European Forum for Intermodal Passenger Travel (2007 - 2010);
g. **KITE** - Knowledge Base on Intermodal Passenger Travel (2007- 2008);
h. **iTravel** - Service platform for the connected traveller (2008 - 2009);
i. **IFM Project** - Interoperable Fare Management (2008 - 2010).

In the following section, a brief overview of the a. – i. listed projects and studies is provided.

2. EU Projects and Studies: A State of the Art Survey on Passenger Inter-modality in Europe

a. **CIVITAS** – Inter-modality in urban areas

Within the context of CIVITAS[1] there are a number of initiatives by which the EC aims to generate a decisive breakthrough by supporting and evaluating the implementation of ambitious integrated sustainable urban transport strategies that should make a real difference for the welfare of the European citizen.

In terms of passenger inter-modality interesting issues appear to be:
> Intermodal local/regional transport interchange;
> Integrated PT Fare System;
> Event-oriented Traffic Management;
> Smart card systems and integrated ticketing.

Intermodal local/regional transport interchange: Intermodal local/regional transport interchange is an important CIVITAS measure for the metropolis aiming at improving inter-modality between all means of transport and, doing so, creating a pole offering a true alternative for the use of private car. The improvement of inter-modality is envisaged to be achieved through the following elements:

> *Reinforcement of the bus attractiveness*: the offer must be consolidated with the purchase of a hundred additional buses. This new offer will make it possible to better structure the service on the territory of the community. During the renovation of the bus fleet, the priority will be given to the vehicles accessible to reduced mobility people and functioning with "clean" fuel.

> *The valorisation of transport in exclusive right of way*: TER (express regional transport, the regional train offer). Further to the future doubling of the subway, it is envisaged an increase in capacity of the TER trains and a frequency increased at the peak hours on three main lines;

> *The organization and continuity between collective and individual transport* by the refitting of existing relay parks or by the creation of new sites;

> *Continuation of tariff integration and multimodal information* in order to separate the various transport systems and to make the offer more coherent and more readable: to use only one single ticket within the metropolis, to propose tariffs for the short trips.

Expected results of this measure with regard to the interchanges in question are indicators to be based on the planning process in relation to travel time, intermodal delays, traffic evolutions, reduction of noise levels, comfort of use level, general satisfaction of the users, reduction of private car traffic, etc.

Integrated PT Fare System: Objective of this measure is to create a real intermodal network (railway, bus and P&R) and to improve usage of public transport

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[1] **CIVITAS I** started in early 2002 (within the 5th Framework Research Programme); **CIVITAS II** started in early 2005 (within the 6th Framework Research Programme); and **CIVITAS PLUS** started in late 2008 (within the 7th Framework Research Programme).

services in the metropolitan area by means of an integrated payment system The new electronic fare system will oblige the user to validate all kind of tickets: in this way there will be a social control that will permit to reduce the frauds. The introduction of an electronic ticketing card will allow increasing the customer retention (fidelity) in order to increase public transport usage. The expected results are seen in:

- General increase of using of public transport 5%;
- Increase ticket sale 2%;
- Reduction of frauds 3%.

Event-oriented Traffic Management: The measure aims at improving the traffic situation in case of events and traffic disturbances (incidents), promoting inter-modality in the context of big events such as football games, open-air concerts, etc. and reducing congestion in road traffic as well as of emissions and travel times through optimal information and guidance of the road users. This is envisaged to be achieved by Integration of the diverse current traffic information into the Integrated Traffic Management Centre (ITMC). The foreseen results are, as follows: Reduction of the severe traffic impacts resulting from traffic disturbances (e.g. capacity constraints, incidents) to the urban networks and reduction in traffic disturbances caused by major events (areas of road-works, concerts, etc.) by 30% during peak hours. Reduction of congestion and faster emptying of parking facilities: Traffic can now leave car parks after a football match much faster because the number of lanes has been extended from two to three. Meanwhile the fourth lane for incoming traffic is now reserved exclusively for pedestrians leaving the area.

Smart card systems and integrated ticketing: Main problems to be solved by this measure refer to the fare system, the financing and the validation system. For that reason, the introduction of a pricing scheme, an integrated ticketing system and specification of possible Smart Card for the public transport are aimed to lead to:

- Improvements in inter-modality between Public Transports (PT);
- Improvements of the attractiveness of PT.

The aimed achievement is seen in the modal share of Collective Transport in metropolis (all modes including walk) from 9, 2 % to pass to 14, 6 % in 2015.

b. **Towards European Passenger Inter-modality**

Or **Towards Passenger Inter-modality in the EU** (01/04-12/04) was a commissioned study by the European Commission, DG TREN, UNIT G3 "Motorways of the Sea and Intermodality" and was guided by the following definition for passenger inter-modality: "Passenger inter-modality is a policy and planning principle that aims to provide a passenger using different modes of transport in a combined trip chain with a seamless journey." The main aim was "to create the basis for an EU work plan in the field of passenger inter-modality, focussing on long distance and cross-boarder

passenger transport as also including the "last urban mile". During the lifetime of this study the following three documents were produced (as each document corresponds to the relative phase of the study development process):

- Report 1: Analysis of the Key Issues for Passenger Inter-modality;
- Report 2: Analysis of the National Inventories on Passenger Inter-modality;
- Report 3: Recommendations for Advancing Passenger Inter-modality in EU.

In general terms, this study defined 39 key issues for passenger inter-modality encompassing from Door to Door information systems for passenger travel, integrated ticketing systems for cooperation in the competitive environment. Next, national inventories of sub-studies have been fulfilled and these exercises revealed strong regional disparities over European regions, meaning some inter-modal passenger thematic fields are more developed them others and also many regions appeared to be unimodal focused in terms of transport infrastructure. The study wrapped up with 28 recommendations accompanied with measures and actions for possible intervention for improvements of the European Passenger Inter-modality along policy recommendations, funding products and services. All these activities established a promising starting point seen in a pool of ideas and options for intermodal passenger travel on European level.

It should be noted that within the recommendations of **"Towards Passenger Inter-modality in the EU** (01/04 - 12/04)" the creation of a Forum on European Intermodal passenger travel was recommended to bring together the stakeholders to overcome market and policy fragmentation. The main tasks of this Forum are envisaged to provide a platform for exchange, knowledge transfer and the promotion of intermodal solutions and strategies. As a result of this, "LINK project – The European Forum on Intermodal Passenger Travel was born. We comment on LINK in *f.* below.

c. **MODAIR** - Measure and development of inter-modality at airports

The airports are interchanges by nature (trans-boarding hubs). Many European Airports start suffering lack of capacity and operational difficulties and therefore more and more are concerned by inter-modality issues. For a given airport, the questions are often to decide to what extent airport inter-modality might be elaborated on and how to assess the potential of inter-modality impacts. Here, the MODAIR project financed by EUROCONTROL in the scope of the CARE INO innovative projects, takes place. The project aims to develop a methodology as well as a tool to measure the airport inter-modality and analyse how the inter-modality development could impact on the airport attractiveness. This project also aims to study and identify instruments (as for instance the kerosene taxation, a new allocation of airport slots) and their impacts on the inter-modality trends.

The MODAIR project is envisaged to develop a methodology based on the building of indicators measuring the level of airport inter-modality. Both the indicators and the analysis of actors/users' expectations in terms of inter-modality trends over

time are used to determine which political and economical measures would favour the inter-modality growth. The last part of the project then aims at determining how inter-modality can increase the airport attractiveness.

d. **Air and Rail Competition and Complementarity**

"Air and Rail Competition and Complementarity" has been a study which purpose has been to investigate:
➢ The factors driving air and rail market share, including journey time and price;
➢ The development of air and rail market share in the future under a range of scenarios;
➢ The operating costs of air and rail transport and future trends in operating costs;
➢ Security issues concerning joint air-rail travel.

In order to evaluate the trends in market share, case studies of eight intra-European air/rail routes have been collected and analysed. At the same time as undertaking the market research, the operating costs of each mode have been researched. Then developed and calibrated was a model of air and rail market share on each route, which was used to project how market share could change in the future under a number of different scenarios. The conducted analysis of security issues arising with joint air-rail services was based on interviews with rail and air operators and airports. This study has been carried out by Steer Davies Gleave, supported by ISIS in France, the German Aerospace Centre DLR, and MSP Solutions on security issues.

e. **eMotion** - Europe-wide multi-modal on-trip information

eMOTION is a Project funded by the European Commission (DG Energy and Transport within the 6th Framework Programme) with the purpose of defining and validating the framework conditions of future services offering, such as:
• real-time traffic information to road and public transport users;
• dynamic (and multimodal) routing services; and
• additional travel-related services such as tourist information via on-trip-devices like PDA/Smart Phones or in-car-systems.

In general, this project seeks to identify obstacles towards an implementation of the so called "eMOTION service" stemming from the general framework it operates in. The project approach rests upon Two Conceptual Pillars: one refers to the organisational, legal and economic issues and the second refers to the technical aspects.

The Conceptual First Pillar: Policies and scenarios for a Europe-wide traffic information service are developed that integrate different types of public and commercial partners like content providers, service operators, service providers, etc.

from different modes of transport (road, rail etc.) with different legal status from countries all over Europe. The policies and scenarios meet in an organisational and legal framework for the service architecture covering the structure of service delivery and contractual relations between the involved stakeholders. This framework provides the basis for the development of business cases to operate such information services, for example, in public-private partnership cooperation, and for the exploitation and transfer of project experiences and results on a European level.

The Conceptual Second Pillar: It is seen within the specification of technical aspects of the service architecture, including applicable standards and their integration, as well as the service architecture addressing the deployment of the eMOTION service and its availability from a technology point of view.

In conclusion, all framework conditions identified are subject to an extensive validation, including an assessment of the service range and of acceptance indicators, to demonstrate the feasibility of the concept.

f. **LINK** - The European Forum for Intermodal Passenger Travel

Based on the contributions made within "Towards Passenger Inter-modality in the EU (01/04 - 12/04)" LINK project was created and funded by the European Commission (DG Energy and Transport within the 6th Framework Programme) for 3 years. It aims to become a communication node between authorities, associations, operators, user as well as industry representatives at different levels of passenger inter-modality. It fills a current gap by serving as a focal point of a European network for passenger inter-modality. Its impact on the European transport sector will depend on its ability to tie in important stakeholders and to link to other actions.

The core of the LINK activities lies in net-working which include conferences, national workshops and five Working Groups each with a different intermodal focus, as follows:

- ➢ WG 1: door-to-door information and ticketing;
- ➢ WG 2: intermodal networks and interchanges;
- ➢ WG 3: integration of long distance transport and the "first/last urban mile";
- ➢ WG 4: planning and implementation;
- ➢ WG 5: context conditions.

The Working Groups want to bring together stakeholders and experts from administrations, politicians, operators, researchers, users groups and the industry, in order to develop practical strategies for rolling out high quality passenger inter-modality.

Within the scope of LINK, a knowledge and promotion centre will structure and monitor research as a key for better understanding as well as dissemination, including

a best practice database and a virtual library (on the project's website). The parallel project KITE (Knowledge base for Intermodal passenger Travel in Europe), a discussion of which is provided in the next section *g.*, fills currently the existing gaps in intermodal passenger travel research with latest and Europe-wide findings which is intended to be transferred by LINK into practice.

g. **KITE** - Knowledge Base on Intermodal Passenger Travel (2007-08)

The main objective of the KITE project is the provision of a Knowledge Base on intermodal travel in Europe. This Knowledge Base shall comprise all relevant information about passenger inter-modality, can easily be accessed and allows stakeholders to develop and evaluate inter-modality-related measures. It will allow to integrate and to disseminate currently existing and future information and data.

The project starts with a compilation and structuring of the state of the art in passenger inter-modality and identifies the gaps to be in-filled. An analysis of existing statistics and surveys gives insight in existing and latent market potentials. Another project part develops a strategic approach for the collection of intermodal survey data. The analyses of user needs and implementation requirements concerning interchange points as well as information and ticketing services provides a catalogue of measures to foster passenger inter-modality.

A tailor-made CBA (cost-benefit-analysis)-technique is envisaged within KITE to assess intermodal measures and strategies. In conclusion, all collected information will be combined in a well-designed knowledge base structure that eases the use, search, update and completion of relevant details. It will cover information about user abilities, attitudes and requirements, recommendations for standards regarding intermodal services, information/ticketing and interfaces, as well as a best-options collection in inter-modality.

An interesting point to note is that the dissemination/exploitation technology employed by KITE is media wiki, which is based on wikis (like Wikipedia e.g.) but additionally allows the annotation of information by specific labels that can be used to refine the linking of thematic issues. Due to non-harmonised wording in passenger inter-modality such ways of combining information give a much better insight in the connections and interdependencies to the users/readers. Thus, the KITE knowledge base appears to be a favourable opportunity to be used as a means for dissemination and exploitation and further projects shall take advantage of it.

h. **iTravel** - Service platform for the connected traveller

iTravel is a project co-funded by the European Commission within the Seventh Framework Programme (2007 - 2013) and focuses on:

- Describing "snapshot" of existing travel and transport services, technologies and stakeholders;
- Identifying main traveller scenarios, multi-modal use cases of i-Travel service platform, and requirements;
- Describing main stakeholder operational and business processes and needed cooperation;
- Evaluating standardised technological and architectural options for the i-Travel service platform to enable delivery of context-aware services;
- Creating organisational models and business tools for the i-Travel supplier community, and begin acquisition of first community members;
- Making a feasibility and risk assessment, and propose a "roadmap for seamless travel services" setting out the milestones and development targets along the path towards deployment;
- Presenting "virtual demonstration" of i-Travel results, and identify scenarios and strategies for i-Travel demonstrations in major European & developing country cities.

In general, content providers have difficulty to reach out to more than a small number of potential end users, while ensuring that their commercial and licensing terms are enforced. Service providers need to find and negotiate separately with a huge number of potential content providers in order to offer a comprehensive end-to-end service towards travellers. Therefore, "i-Travel" is an original concept for "the connected traveller" that combines three key innovations:

1. a "**virtual travel assistant**" service that accompanies a traveller before and throughout each journey, providing personalised, context-aware information and support whenever, wherever and however needed, based on:

2. the **integration of e-commerce** and **internet technologies** to create the first B2B "eMarketplace" in the traffic and travel information services sector, through which:

3. a **wide-ranging community of content** and **service suppliers** connects to customers through i-Travel to serve new markets of travellers needing instant delivery of content and trip support.

Thus, for the travellers, i-Travel will put the right information and the right services in the travellers' hand, just when they need it. On the other hand, for the suppliers, being a member of the i-Travel community will give direct access to the one and only secure, dynamic marketplace where agents representing all the world's "connected travellers" gather to buy real-time content and value-added travel services on behalf of their customers.

i. **IFM Project** - Interoperable Fare Management

This project is funded through the Seventh Framework Programme of the European Commission (2007-2013) and is directed at making the mobility of people more efficient and environmentally sustainable by facilitating informed modal switching and the seamless accessibility of public transport. It aims at innovative, safe and reliable ticketing and fare management across Europe using interoperable smart media with the specific aim of encouraging increased usage of public transport. The work plan and its work packages are designed to facilitate the following operational impacts:

- Greater awareness of the benefits of applying smartcard enabled ICT Solutions to Implement harmonized Interoperable Fare Management for scheme for operators, customers and government across Europe
- The dissemination of knowledge of how to set up an Interoperable Fare Management scheme, the ICT systems, the players, their roles, and how to achieve the maximum benefits
- The spreading of excellence through the description of best practice in meeting European standards
- The respect of privacy through the adoption of a common privacy model compatible with the business needs
- The enhancement of security and minimisation of fraud by the adoption of a shared trust model

The expected beneficiaries of IFM Project will be:

- ➢ **Transport Customers** ("users") that will be able to use their local IFM transport cards outside their home networks as well as to use a multi-application contact-less wallet of their choice to upload the transport applications they need and carry the virtual transport tickets attached to each of them;
- ➢ **Transport Authorities** that will be able to build new fare and distribution agreements with the support of standardised specifications.

In conclusion this project is expected to produce new inputs to set objectives to complement the existing set of standards for the data elements necessary to support electronic ticketing.

3. Conclusions and Perspectives

Currently, the passenger inter-modality in Europe appears to be in a difficult situation. It has been argued that the European citizens have unsatisfactory access to quality transport systems capable of meeting their needs. Therefore, a number of projects and commissioned studies have been launched by the European Commission in order for the critical issues and barriers for seamless passenger mobility in Europe and beyond to be identified and tackled. In this paper, a number of projects and studies dealing with passenger inter-modality in Europe have been reviewed. It appears that the subject of passenger inter-modality has been understood and approached from different angles. Also, foundations for further initiatives are ground and as a result 3

new projects are awarded to be funded within the call of FP7, TPT-2008-RTD-1, Topic TPT.2008.13: "New mobility/organizational schemes: interconnection between short and long distance transport networks", as follows HERMES, CLOSER and INTERCONNECT. These projects are foreseen to start in early September 2009 and we look forward for their contributions.

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