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TM 2.0 - DATEX II for logistics applications

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Abstract

The purpose of this paper is to demonstrate the development and implementation of DATEX II for logistics operations and to further examine how to link TM2.0-DATEX II to the hinterland. For this purpose, an approach based on data model development is presented for two case studies, namely the Port of Hamburg and the Port of Trieste, and integration in the DATEX II main model is also examined. The objectives of this work are to engage logistics companies into electronic data interchange, to accelerate the information system development processes as well as to decrease costs of information system integration by adopting a common international recommendation for information exchange. It is expected that the use of universal message standards will eliminate the need of logistics companies to create their own specifications leading to greater efficiency of logistics operations, across transport modes.

Keywords: Traffic Management, DATEX II, logistics

Introduction

The ERTICO Innovation Platform on interactive traffic management, TM 2.0 was launched at the ITS Europe Congress in Helsinki in 2014. It groups together traffic management stakeholders, such as OEMs, Traffic Information Service Providers, Road Infrastructure providers, Public authorities and Road Operators for cities and regions in Europe responsible for the management of urban as well as interurban traffic, ITS research centres and road-network users associations.. The TM 2.0 concept focuses on enabling vehicle interaction with traffic management plans and procedures. By bringing together traffic management stakeholders and other related "enablers", the TM 2.0 Platform aims to pave the way for the TM 2.0 concept to be implemented in various cities and regions around Europe leading to a win-win situation for all actors. By issuing a series of recommendations, the TM 2.0 Platform serves as a catalyst that accelerates the current traffic management- related activities by both the Industry and the public authorities, towards providing innovative Traffic Management practices.

The 26 members of the TM 2.0 Platform believe in the cooperation among traffic stakeholders and in the adoption of architecture for traffic management to be deployed to the specific region or city in focus. Individualities are important when one aims for functional- tailor-made traffic management. The main issues being tackled by the Task forces of the Platform are the number of minimum datasets required for providing TM 2.0 services to drivers and traffic management centers, as well as the reliability and

quality of data. The TM 2.0 Platform members are in the process of agreeing common interfaces which can facilitate the exchange of data and information between the road vehicles and the traffic management centers. This interaction leads to improvingthe total value chain for consistent traffic management and mobility services as well as avoiding conflicting guidance information on the road and in the vehicles themselves.

Ideally, information about how, when and where people and freight plan to travel or are travelling will form part of the data exchanged between (Traffic Management Centers) TMCs and (Service Providers) SPs, so that the (re)routing options offered to the travellers can meet both the aforementioned TM 2.0 objectives as well as the individual traveller's needs. This concept of evolved traffic management, opens new business opportunities for all the stakeholders involved along with new forms of synergies from the organisational point of view. Extending the approach to link the hinterland transport opens up new horizons for additional stakeholders such as ports to be part of the urban planning of the city and also to involve them more actively in the decision making approach of traffic management.

The objectives of the TM 2.0 task force n links to hinterland are to:

- Analyse the possible needs for new interfaces and communication technologies, standards for next generation Traffic Management systems and links to hinterland (especially Ports)
- Identify urban and peri-urban use cases which will be relevant
- Examine relevant use cases in cooperation with DATEX II and TISA
- Analyse the value proposition, business models and governance patterns (involvement of new stakeholders including ports, in the supply chain)
- Propose a roadmap or a strategy plan for integrated port-road traffic management systems

Current scene in traffic management

Smart Infrastructure can be divided into two different categories: digital and physical smart infrastructure. It is important to distinguish between these two, as they are different in characteristics. The physical smart infrastructure consists of roads, tunnels, ports, warehouses, terminals,distribution centers and similar asset based facilities. Within the physical smart infrastructure context, smart vehicles support a two-way information flow through the ICT systems that belong to the digital smart infrastructure category. In this way, the smart vehicle is connected at all times, providing real time information as needed. On the other hand, the smart digital infrastructure retrieves, manipulates, stores and communicates data and information between the physical smart infrastructure and the smart vehicle using different digital technologies such as sensors, cameras, databases, and positioning technologies. Overall, the smart infrastructure enables information exchange about the goods, vehicles and infrastructure.

Identification of Stakeholders

On the private entity side, several stakeholders arise that can provide traffic management data from their services and/or can benefit from using data as provided by public entities. Below, some of these entities are presented and general service characteristics, business cases and possible benefits that could be reaped by being involved in traffic management data exchange, are also demostrated.

The most dominant private parties involved in traffic management data exchange at this moment, are

content service providers. More specifically, content service providers with high numbers of active users, have a broad and real-time data source for monitoring the status of the road infrastructure and (given the amount of trips that are pre-planned), even know where traffic is to be expected. Currently, these service providers provide their navigation based on a combination of their own monitoring and use of publicly provided open data on travel times, congestions, roadwork, etc.

Regarding the road infrastructure providers, we distinguish between public entities (Traffic and Transport authorities and administrations) and private road operators. Within the same geographic region, public entities are interacting in several forms and on several levels (with corresponding policies) and with private road operators (e.g. a toll tunnel or toll road). The complexity of traffic management when it comes to road infrastructure in a certain geographic region, is that there is one common road network however, the road infrastructure providers involved all have different needs and issues to manage. For a motorway operator these include a smooth and safe traffic flow over the motorway 'pipelines'. For urban road infrastructure providers these also involve balancing flows of motor cars, trucks over the same streets and intersections in the city centre. For inter-urban road infrastructure providers, these entail the link to the hinterland transport such as ports.

For a port operator, the main objectives are to optimise port accessibility, increase safety, reduce emissions as well as develop sustainable and efficient traffic management by separating local traffic from truck traffic. Nowadays, the only way drivers can get information on port traffic, bridge use, and parking, is through the message boards posted throughout the port. Outside the port area, the truck drivers usually have very limited access to information, even with the advent of mobile devices. Standard traffic apps and internet searches cannot provide real-time information related to actions inside the port. In addition, many trucks make multiple stops at the port and to various destination cities in Europe to load and unload. The increasing truck traffic in the vicinity of the port gates can have an impact not only in terms of congestion in the vicinity of the terminal but also on the surrounding roadway network, causing congestion problems and reducing the terminal/port performance and that of the shippers' as well. The use of innovative, IT-based traffic information systems and an integrated port traffic control center is expected to improve traffic flows and make optimum usage of the port routes. There is an opportunity to use a port-wide traffic management system that constantly records, processes and distributes transport and traffic information to all interested parties including service and content providers and also trucks drivers. "Unplanned" parking is an inevitable negative side effect in areas around airports and ports. For an infrastructure operator 'unplanned' parking is a black box, disturbing the daily operations due to insufficient transparency about parking situation (location, duration, peak hours). Truck drivers are moving in long-distance trips, moving cargo from origin to a logistics destination as the (air)port logistics hub. The fleet operator is managing the fleet in real-time and access to the parking area information available in the truck route and offers the driver the best place to rest or wait before arriving to the hub. Based on adequate sample fleets GPS data from smart phones or fleet management systems can monitor standstill, travel time and time losses for the truck waiting for the required customs clearance. Such data can be used to set-up a dynamic park guidance and slot booking system for future development along with improved management of rest times

required for truck drivers (deployment and business operation). In fact, some of them use an access system based on a paper ticket given at the truck entrance moment in the parking area. The same ticket is used for a manual payment at the checkout moment. In specific, no access monitoring and control is performed, as no related electronic payment systems are available. Dry-port managers can have interest in installing new monitoring systems, linked to ICT platforms able to provide new services like the electronic payment. In this way, the dry-port manager can achieve more data on truck flows, can use them to establish fares policies and, mainly, can better manage the cash flow. The customers (transport operators) will benefit of the availability of a new payment service, receiving all the payment documents electronically. The truck drivers will not be obliged to pay manually, wasting time for the checkout in queues. Finally, software developers and technology providers will find new business development opportunity in dry-ports area, adapting existing platforms to the dry-port manager IT system or developing new products.

Pilot cases

This paper identifies pilot cases examples of exchange of Traffic management plans between service providers, ports and Infrastructure operators

Port of Trieste-

Located in the heart of Europe, the Port of Trieste is an international hub for overland and sea trade with the dynamic market of Central and Eastern Europe. Within the Trieste port-city, there are many specific challenges regarding the implementation of C-ITS solutions for efficient traffic management. Below we present some challenges that relevant port stakeholders are currently facing.

The main challenge for the Port Network Authority of the Eastern Adriatic Sea - Port of Trieste, is to monitor the length of the queue on the Trieste Port gates. Terminalists on the other hand, would like to know if and when a truck to be loaded on current ship is arriving, as well as to monitor truck movements on the motorway and the queue on the Trieste Port gates.Since the parking lots in the Trieste Port are limited in number, it is important to distinguish between trucks destined for immediate embarkation and truckswaiting for a ship that has not yet arrived. In the latter case, traffic management measures have to be applied to avoid port congestion, i.e. waiting trucks should be redirected to the local dry port, Fernetti, that is located approximately 20 km from the Port. Autovie Venete motorway is interested in knowing in advance flow of trucks that leavethe Interport of Trieste - Fernetti and the Terminals at Trieste Port to predict possible congestions. Trieste Municipality is interested in reducing track queue awaiting to enter at Trieste Port gates, also for safety reasons. The motorway congestion is also of interest for the Interport of Trieste, for planning the hour of departures of trucks. Furthermore, several cruise ships are departing/arriving in Trieste at Stazione Marittima, a Trieste Port area in the city center. This affects vehicle movements and parking in a critical area in the Trieste city center.

Relevant projects

In this section, projects related to Traffic Management in the Trieste port-city context are presented.

CIVITAS PORTIS[1] is a global project for sustainable mobility planning, that will test innovative and sustainable urban mobility solutions in five European port cities (Klaipeda, Aberdeen, Antwerp, Trieste, Constanta). The project aims to improve governance for an enhanced cooperation between cities and ports, create more sustainable and healthier city-port environments, shape more integrated transport infrastructure and mobility systems and improve the efficiency of urban freight transport. In particular, the following Traffic Management related objectives are set for the Trieste case: development of a Transport Information Platform, establishment of a Multi-Governance Technical Office, promotion of Soft Mobility, introduction of a hybrid and innovative public transport system, promotion of sustainable mobility to cruising tourist, integration of the parking management system, control of urban access, coordination of freight movements, regulation of access to the port area and integration of SUMP (Sustainable Urban Mobility Plan). Since January 1st 2017, the Old Port areas of the Trieste Port have been released from the Free Port status and put under the competence of the Trieste Municipality consisting of 600.000 sqm area in the city center. This recent acquisition has totally changed the city framework. It is therefore necessary for the city of Trieste to develop a SUMP to ensure the Old Port areas are fully incorporated into the overall mobility strategy of the city. This requires a total rethinking of urban mobility within the port-city context.

The URSA MAJOR NEO project enables the development of ITS services to improve freight traffic on the TENT road network along the CEF RHINE-ALPS and SCANMED core corridors, linking the North Sea ports, the Rhine region and the Ruhr, the metropolitan areas of southern Germany and northern Italy with the Mediterranean ports up to Sicily. Project partners come from Germany, Italy and the Netherlands.

Port of Trieste- interfaces

- DATEX II[2] file for traffic congestions on the Autovie Venete S.p.A. motorway
- Proprietary format for arrivals/departures of trucks on Interport of Trieste
- Proprietary format for arrivals/departures of trucks on Trieste Port
- Proprietary format for arrivals/departures of trucks on the ICT system of Samer Seaports & Terminal

Datex II offers useful information for the traffic management plan. The cities have to integrate to the standard protocol. Autovie Venete S.p.A. uses Datex II, the Port of Trieste plan to implement Datex II and the Comune di Trieste is interested in adopting it.

Port of Hamburg (*HPA*)

- As one of Europe's largest container ports, port of Hamburg aims to become a model port for sustainable and forward-looking urban mobility. Due to its special location within a major German city the challenges for the port traffic management are many, across different modes of traffic. The Port of Hamburg is seeking gain visibility into i) the container availability from the container terminal, ii)the Estimated Time of Arrival of the train, iii) the availability at the inland

1 http://civitas.eu/portis

2 http://www.datex2.eu

terminal, and iv) the Estimated Time of Arrival at the final customer delivery point. Main challenges Multimodal, end to end, real time visibility for maritime container flows for the Logistics hubs Hamburg and Frankfurt, Trieste increased collaboration along the core network corridor.

- Re-align multi-modal based supply chain operations so as to enhance and to maintain the competitive performance of the Logistics hubs Hamburg and Frankfurt (incl. Hub2Hub supply chain), Increase hub competitiveness, efficiency and reduce emissions (e.g. CO2) and congestion for Hamburg / Frankfurt and Trieste metropolitan areas

Port of Hamburg- interfaces

Back in 2010, the Hamburg Port Authority (HPA) already installed measuring points at the most important traffic intersections in the port area. Induction strips and detectors precisely measure traffic volume, vehicle type and speed. The Port Road Management Center collects all system data on the current traffic situation o routes in the port. The IT-based data system uses cutting-edge technologies to equip itself to deliver rapid, reliable information. Yet all this is only the beginning of a comprehensive traffic management system in the port to cover all three modes of transport, road, rail and waterway. Sensors permit collection and evaluation of data on the traffic situation, also parking space availability and bridge closure times, and passed on to drivers and others, among other means by DIVA information panels in the port (DIVA - Dynamic Information Panels on Traffic in the Port of Hamburg) or via SPL. Similar systems are also in place for rail and waterway traffic. The notifications generated can, where needed, provide aid in planning runs or show possible alternatives, e.g. with an alternative route or a parking space where waiting time can be spent. As such the TMC uses DATEX II and their next steps is to integrate this into DIVA.

Next steps

The first steps of the task force have been to liaise with the DATEX II community to explore ways how this extension of DATEX II in the hinterland connections will take place. Initially, the possible needs for new interfaces, communication technologies and standards for next generation Traffic Management systems and link to hinterland (especially Ports) were analyzed. Then two relevant use cases were identified and examined in cooperation with DATEX II and the project AEOLIX H2020[3]. Next, the task force will aim to analyse further the value proposition and business models in order to propose a roadmap or strategy plan for an integrated port-road traffic management system.

References

1. TM 2.0 http://tm20.org

[3] http://aeolix.eu