Ministry of Transport and Communications

The Smart Transport Corridor Helsinki – St. Petersburg

FITSRUS

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Ministry of Transport and Communications

Vision
Well-being and competitiveness through high-quality transport and communications networks

Mission
The Finnish Ministry of Transport and Communications seeks to promote the well-being of our people and the competitiveness of our businesses. Our mission is to ensure that people have access to well-functioning, safe and reasonably priced transport and communications networks.

Values
Courage, equity, cooperation

Ministry of Transport and Communications

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Abstract

The Smart Transport Corridor (STC) between Helsinki and St. Petersburg aims to improve sustainable mobility and effective flows of goods by systematically utilising advanced ITS services. The Smart Transport Corridor covers all modes: road, rail, sea and air and addresses both personal and freight transport including also ports and terminals and border crossings. In this starting phase, the project focuses mainly on road transport, which is facing the greatest challenges in the near future.

The project has been carried out in cooperation with the Finnish and Russian public and private organisations. In Finland the STC concept has been created in FITSRUS project that will be finalised with the delivery of this document.

The STC project aims to solve the identified transport and mobility problems in the corridor. The goal is to open new possibilities for the operators and even for the regions related to the corridor: The leading idea in the STC project is to develop and provide similar and interoperable services for corridor users, allowing them to utilize services with their own familiar devices and interfaces. Secondly, the project implies a need for better data, data sources and possibilities to provide information and ideas on how to exchange data among and between authorities and business operators. The third fundament is based on the system approach opening the utilisation of data and information by defining system interfaces, utilisation of standards, recommendations and code lists for exchange and representation of data. A major element in this entire process towards effective services is related to the utilisation of the open data principle, which enables the exporting and interoperability of services, as well as opening markets for competitive service procurement.

Two related projects have been conducted simultaneously: Interfaces, standards and code lists in data communication between authorities, and a Traffic Flow Forecast. The summaries of these projects have been attached as annexes to this report.

The project was steered by Transport Ministries of Russia and Finland. Steering groups in respective countries were chaired by the Ministries of Transport and the membership, and consisted of representatives from various stakeholders on a wide scale. The basis of the project was defined in the MoU signed by both Ministers of Transport in Moscow in September 2011, which also included a definition of the first four pilots.

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Tiivistelmä

Älyliikennekäytävän Helsinki-Pietari tavoitteena on kehittää kestävää liikkumista ja tavaraliikenteen toimivuutta hyödyntäen kehittyviä älyliikenteen palveluita. Älyliikennekäytävä sisältää kaikki eri liikennemuodot: maantie-, rautatie-, meri- ja lentoliikenteen ja sekä henkilö- että tavaraliikenteen, ja kattaa myös satamat, terminaalit ja rajanylityspaikat. Hanke keskittyy alkuvaiheessa pääasiassa tieliikenteeseen, joka on kohtaamassa suuria haasteita lähitulevaisuudessa. Hanke on toteutettu yhteistyössä Suomen ja Venäjän julkisten ja yksityisten organisaatioiden kanssa. Suomessa älyliikennekäytävän käsite on luotu FITSRUS -hankkeessa.

Hankkeen päämääränä on ratkaista liikenteen ja liikkumisen ongelmia Helsinki-Pietari käytävällä. Tavoitteena on luoda uusia mahdollisuuksia älyliikennekäytävän käyttäjille ja myös käytävän alueille: johtavana ajatuksena on kehittää ja tarjota samanlaisia ja yhteisesti toimivia palveluita, joita käyttäjät pystyvät hyödyntämään omilla laitteillaan saman käyttöliittymän kautta. Lisäksi hanke tuo ilmi tarpeen parantaa tietoja, tietolähteitä ja mahdollisuuksia tarjota informaatiota ja ideoita vaihtamalla tietoa viranomaisten ja yritystoimijoiden kanssa. Lähtökohtana on myös avata tiedot tiedonhyödyntäjille määrittämällä rajapintoja, hyödyntämällä standardeja, laatimalla suosituksia ja koodiluetteloita tietojen vaihtoon ja esittämiseen. Tärkeä osa koko prosessin edistymistä kohti tehokkaita palveluita liittyy avoimien tietojen hyödyntämiseen, jonka periaatteena on aktivoida palveluiden ja markkinoiden vientiä sekä yhteentoimivuutta kilpailukykyisissä palveluhankinnoissa.

FITSRUS hankkeen rinnalla on toteutettu kaksi tätä työtä tukevaa hanketta: rajapintojen, standardien ja koodiluetteloiden tiedonvälitys viranomaisten kesken sekä Suomen ja Venäjän välinen liikenne 2020 ja 2030. Tiivistelmät näistä hankkeista on liitetty tämän aineiston liitteiksi.

Älyliikennekäytävä Helsinki-Pietari -hanketta ohjasivat Venäjän ja Suomen liikenneministeriöt. Maiden ohjausryhmien puheenjohtajina toimivat liikenneministeriöt ja ryhmien jäsenet edustivat laaja-alaisesti eri sidosryhmiä. Hankkeen perusta on määritetty aiesopimuksessa, jonka ovat allekirjoittaneet molemmat liikenneministeriöt Moskovassa syyskuussa 2011. Aiesopimuksessa on myös määritelty neljä ensimmäistä pilottia.

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Ämnesord
En intelligent transportkorridor, intelligenta trafiksystem, intelligent betjäning

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Sammandrag

Syftet med den intelligenta transportkorridoren (STC) mellan Helsingfors och St. Petersburg är att förbättra den hållbara mobiliteten och effektivera godsflödena mellan länder med hjälp av systematiskt avancerade ITS-tjänster. Den intelligenta transportkorridoren inkluderar alla transportmedel: landsväg, järnväg, sjö- och luftfart, vilket avser både person- och godstransporter samt inkluderar hamnar, terminaler och gränsövergångar. I denna inledande fas av projektet fokuserar man främst på vägtransporten som står inför de största utmaningarna den närmaste framtiden. Projektet har genomförts med samarbete med finska och ryska offentliga och privata organisationer. I Finland har STC-konceptet skapats i FITRUS-projektet som kommer att slutföras i och med leveransen av detta dokument.

STC-projektets syftar till att lösa transport- och mobilitetsproblem som man identifierat i korridoren. Målet är att öppna nya möjligheter för operatörer och även för regionerna i anknytning till korridoren: Den primära idén i STC-projektet är att utveckla och erbjuda liknande och kompatibla tjänster för alla korridorens användare samt göra det möjligt att utnyttja tjänsterna med egna bekanta apparater och gränssnitt. Sekundärt innebär projektet att det behövs bättre data, datakällor och möjligheter att tillhandahålla information och idéer om hur man kan utbyta data bland och emellan myndigheter och företagare. Det tredje fundamentet bygger på att systemapproachen öppnar användningen av data och information genom att definiera systemgränssnitt, utnyttjande av standarder, rekommendationer och kodlistor för utbyte och visning av data. Ett centralt element i hela processen mot effektiva tjänster berör utnyttjande av principen om öppen data vilket möjliggör export av och samverkan mellan tjänster och att öppna marknaden för konkurrenskraftig tjänsteupphandling.

Två liknande projekt har genomförts samtidigt: Gränssnitt, standarder och kodlistor i datakommunikation mellan myndigheter samt Trafikflödesprognoser. Sammandragen från dessa rapporter är bifogade som bilagor till denna rapport.

Projektet leds av transportministerierna i Ryssland och Finland. Styrgrupper i respektive land leddes av transportministerierna och medlemmarna bestod av representanter från olika intressenter i stor skala. Grunden i projektet definierades i MoU och signerades av båda transportministrarna i Moskva i september 2011. Definitionen på de första fyra piloterna ingick också.

Foreword

Today, Intelligent Transport Systems (ITS) are at the heart of transport actions due to their ability to greatly support the development of better transport services to citizen and business. In addition, they deliver new management tools and business opportunities, which serve efforts towards better well-being and competitiveness.

Transport networks consist of nodes and corridors. Transport corridors cater for transport flows and in main corridors, they are the primary channels and connectors of different regions, cities and even countries. Major transport corridors also include different modes of transport; road, rail, maritime and air and the additional functions as border crossings, ports etc. infrastructures with related services. ITS is a major contributor in this field, as it answers the need for new and high-level services within each mode and works as an integrator between modes to form a well-functioning transport system.

The FITSRUS project opened the development of the cross-border Smart Transport Corridor (STC) concept between Helsinki and St. Petersburg. It was launched in 2011 by the Finnish Ministry of Transport and Communications together with the Russian Ministry of Transport. The aim is to develop a concept and then implement it in the corridor so that it will result as smooth, safe and sustainable travelling, which utilises opportunities made available by advanced technology.

This project has been managed and commissioned by the Finnish Ministry of Transport and Communications. The Management Committee on the Finnish side of the project consisted of representatives from the Finnish Transport Agency, the Finnish Transport Safety Agency, the Finnish Customs, the Centre for Economic Development, Transport and the Environment for Southeast Finland, the Confederation of Finnish Industries, the City of Helsinki, the Finnish Meteorological Institute and ITS Finland. The Finnish consortium, which was responsible of the actual development work during 2011 – 2012, was led by VTT Technical Research Centre of Finland together with TIEKE Information Society Development Centre, Nokia Siemens Networks, SITO Consulting, Indagon, Vaisala and Siemens Osakeyhtiö.

Helsinki January 30th 2013

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Contents

Introduction

The main goal of the Smart Transport Corridor between Helsinki and St. Petersburg STC–project during 2012 was to define the general concept for developing Intelligent Transport Services to the corridor and to prepare the first pilot plans to demonstrate the process. This document describes the main results of the planning phase including the STC concept, vision, pilot roadmap and the first pilot plans. This document also includes the summaries of the results of the supporting projects: *Interfaces, standards and codes in Data communication between Authorities*, and *Study on the traffic flows between Finland and Russia*.

The Finnish Ministry of Transport and Communications and Russian Ministry of Transport have a long history of cooperation in various transport related and cross-border issues. The project for ITS cooperation and Smart Corridor was brought up in negotiations in 2010-2011. The procurement process for finding a consortium for Smart Corridor pilot planning in Finland was carried out in Spring 2011 and the consortium with VTT (together with TIEKE Information Society Development Centre, Nokia Siemens Networks, SITO Consulting, Indagon, Vaisala and Siemens Osakeyhtiö) as a leading partner won the bidding competition for the planning phase (from 2011 to 2012) . Russia held its own Smart Corridor procurement process later in 2012. In Russia the leading partner is ITS Russia.

The First chapter of the document introduces the background and policies that are set as a foundation for the project, and the development environment is also described.
In the following chapters (2- 4) the core issue of the project is introduced in the form of STC-vision, objectives and the general concept of the smart corridor services development. After this, in chapter 5, the concept creation process is discussed with a more in depth approach and in chapter 6, the implementation and piloting part principles are described. This part also clarifies the general roles of different stakeholders in the Smart Transport Corridor and introduces key principles and an approach for the development of services such as utilizing the standards and interfaces, as well as the open data principle as the catalyst for service innovation and development. In this chapter the first phase pilot plans are also described.

Chapter 7 summarises the project findings in the form of conclusions and recommendations for further development and proposals for the next steps in the Smart Transport Corridor and the service creation and implementation.
Simultaneously with STC-project two related projects have been conducted: Interfaces, standards and code lists in data communication between authorities and Traffic Flow Forecast. The reports of these projects are attached as annexes to this document. The General Project Plan, STC concept document and related pilot plans have been jointly prepared and agreed upon by both Finnish and Russian project teams, however the views and visions in this document are mostly described from the Finnish viewpoint.

1. Background

The transport and travel between Russia and Finland has grown since the early 1990s. There was a steady growth in the number of heavy transport vehicles crossing the South-Eastern border of Finland up until it reached the peak of 80 000 trucks per month in 2008. In the beginning of 2009, the number was cut in half due to the economic recession, but started a vibrant growth again in 2010 and is presently well over 60 000 vehicles per month. In 2011 a total of 7,3 million foreigners visited Finland; three million of these visitors came from Russia (the annual growth was 27 %).

Freight and passenger traffic between Finland and Russia is going to increase significantly in the following years. Traffic is going to grow in all modes of transport, but the challenges are going to be especially difficult on the South-Eastern border of Finland, where border crossing smoothness and overall traffic safety and convenience may deteriorate. Passenger traffic is growing rapidly, and the visa exemption between Finland and Russia will strengthen this development. Russian WTO membership will increase cross-border trade and freight traffic will intensify.

Passenger traffic growth is expected to continue. The growth still consists mostly of those tourists who travel from Russia to Finland. Nevertheless, the growth of rail passengers is an interesting detail; their number is expected to double by 2020 and triple by 2030. So far, Finns have been the dominant group of rail passengers between Finland and Russia, but the future development of the distribution of rail passengers remains to be seen; developments are going to be interesting.

Freight flows between Finland and Russia consist of bilateral trade and transit traffic. Russian exports are projected to grow by 35 % from the year 2011 to 2020, and 91 % by the year 2030. The corresponding increase in Russian imports is expected to reach 49 % by 2020 and 126 % by 2030. According to forecasts, the Russian exports outside the European Union will grow significantly more than to the EU[1].

The freight traffic in all border stations has been estimated to increase by approximately 30 % in 2020 and by 50 % in 2030. Rail transport will increase less than the freight traffic in border stations. The greatest increase is expected in the port of HaminaKotka, where transport has the potential to grow by more than 250 % when compared to the current transport volume. Transit traffic via Finland to Russia is growing, despite the expected large increase in port capacity in Russian Baltic ports[2].

The challenges resulting from this development are going to have an impact in border crossings and in overall traffic safety and convenience. With more people, vehicles and traffic the related problems like congestion, accidents and disturbances are also going to increase. Proactive measures and services are going to be needed in order to handle the growing traffic. People must be well informed in advance of any safety endangering disturbances, about services along the route, as well as the availability of public transport etc. in order to be able to make choices and plan their travels. In both countries there are established traffic managements systems that should be developed to be interoperable and to provide continuous, real-time information on the traffic situation. Hence, having a real time view on traffic fluency in the whole corridor area will have a positive impact on load sharing between the border stations. This will also help bus operators and hauliers optimise their operations.

1 Traffic Flow Forecast 2030 -project, 2012
2 Traffic Flow Forecast 2030 -project, 2012

As a service for authorities, there are already cross-border systems like RAISA – a train operating system, which functions in both countries. The creation of common emergency rescue services like eCall is also of interest.

1.1 National ITS Strategies (Finland – Russia)

In Finland, intelligent transport service development is based on the National Strategy for Intelligent Transport[3] published in 2009. It established a national vision for smart traffic until the end of the decade and defines the principles for development of smart traffic services. The national Strategy identifies the main points of emphasis for the development and names the projects to realise them. The Strategy also strives to define the roles and cooperation of the various parties involved.

The Strategy for intelligent transport connects national transportation and information society policies with practical utilisation of new information and communication technologies in transportation. The aim is to focus action and attention to transport system service capacity and network operation.

According to the Strategy, intelligent transport services ease citizens' and enterprises' daily life, improve traffic safety and work productivity, enhance logistics and facilitate new business models. While technological innovations are essential for the development of intelligent transport services, many existing technologies can also be utilised. What is more, the intelligent transport services to be developed are to be based on the principles of national coverage and international compatibility. Smart traffic and its practices come about from cooperation and interaction between public and private service providers and various different user groups.

The aims and focuses of the National Strategy for Intelligent Transport include safer and more fluent traffic and reduction of logistics costs due to more efficient operation and utilisation of digital practices. By 2020 Finland should be a smart traffic forerunner that produces and exports intelligent transport services and products. The update of the National Strategy will be published soon.

The focus areas include:

- Public transport systems and services
- Traffic management, information and control
- Automated enforcement
- Vehicle safety systems
- Accident and incident management
- Road user charging systems
- Electronic freight operation systems (e-Freight)
- Public sector data availability and utilisation.

The STC project supports and facilitates many of the aims and principles of the National Strategy. The selection of smart traffic service pilots underlines scalability, multiplication potential and international compatibility. On a national level, the development of a comprehensive smart corridor aims to improve Finland's logistic compatibility and attractiveness as a transit route.

1.2 Regional Policies (South- East Finland – St. Petersburg Region)

At the moment, some 80 % of the passenger and freight traffic between Finland and Russia cross the border on checkpoints between South-East Finland and the Leningrad area. After crossing the border the people and the cargo continue respectively to Helsinki

3 http://www.lvm.fi/c/document_library/get_file?folderId=440554&name=DLFE-10001.pdf

and St Petersburg and further to European Union and Russia. This corridor between South-East Finland and the Leningrad area encompasses all modes of transport, particularly roads and railroads, but on a larger perspective also maritime transport, including the Saimaa Canal.

The potential of intelligent transport for reduction of environmental impact and improvement of energy and transport efficiency and cargo terminal logistics should be carefully utilised particularly on transit transportation passing through South-East Finland and the Leningrad area.

There is no regional intelligent transport strategy for South-East Finland, but the development needs and opportunities have been observed in the national Strategy. Intelligent transportation is also addressed in the Kaakkois-Suomen liikenteen hallinnan ydinsuunnitelma[4] (South-East Finland Transportation Management Core Plan). In addition to the National Strategy for Intelligent Transport, the Core Plan is based on the Road Traffic Management Strategy (2010)[5] of the Finnish Transport Agency. What is more, the issues are also discussed in the E18-tien liikenteen hallinnan telematiikkastrategia (2008) (E18 Traffic Management Telematics Strategy) and Kaakkois-Suomen rajaliikenteen hallintajärjestelmä, toimenpidesuunnitelma (2007) (South-East Finland Cross Border Transportation Management System, Action Plan) E18 between Turku – Vaalimaa will be equipped with road side traffic management systems including traffic data and weather sensors, cameras, and variable message signs while the road is improved as a motorway during the next few years.

The KETJU reports[6] published in 2009 describe the actions required, initial cost estimates and responsibilities for the development of public transportation in Lappeenranta – Imatra area, Kouvola area and Kotka – Hamina area. Local and regional public transportation service development is to focus on bus transportation and inter-regional public transportation is to be based on rail transportation.

It is challenging to influence transport mode distribution of passenger and freight transport by traffic management only. Increasing the share of more environment friendly modes of transportation requires a shared understanding and determination to develop infrastructure and standards of activity.

When it comes to active transport network operation, relevant issues include for example the development of alternative backup routing, hazardous cargo transport disruption handling and operations required on the most problematic main road stretches.

The comprehensible concept of intelligent transport and logistics services in the Helsinki – St Petersburg corridor is based on

- The smart transport and logistics corridor to be comprised on the stretch;
- interfaces on public authority services and available data resources;
- service development and production by innovative private companies on both sides of the border;
- interfaces with related Finnish, Russian and European development projects;
- research and development including the improvement of safety and sustainable development, consideration of special regional characteristics and the promotion of enduring business activity and regional competitive advantage.

4 http://www.ely-keskus.fi/fi/tiedotepalvelu/2010/Documents/Kas_LH_raportti.pdf
5 http://www2.liikennevirasto.fi/julkaisut/pdf3/lto_2010-01_tieliikenteen_hallinnan_web.pdf
6 http://www.lvm.fi/c/document_library/get_file?folderId=339549&name=DLFE-9805.pdf&title=Julkaisuja%2039-2009

In addition to improving national logistic competiveness, the results of the STC project also increase regional competitiveness. According to the national logistics review, companies in eastern Finland consider their logistical position to be weaker than elsewhere in Finland. Smart Transport Corridor services create new business opportunities for companies operating in the area and encourage establishment of new companies. Finally, fluent and predictable traffic on the roads improves safety and wellbeing of the people living and working by the Corridor.

1.3 General ITS Guidelines

In 2011, the EU Commission published a white paper on the Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system (2011/2096(INI))[7]. The white paper lists concrete transportation policy initiatives for the next decade. The goals are to:

a) optimize the use of transportation infrastructure capacity for example by adopting the 'single window' and 'one-stop administrative shop' concepts;
b) improve safety for example by the eCall emergency messaging system;
c) reduce the environmental impact of transportation by intelligent tolling and taxation.

It is notable that the White Paper underlines the external dimension, transport outside the European Union borders. The European Commission strives to open up third country markets in transport services, products and investment. The STC project puts into practice the last external dimension goal of the White Paper: "Build on established research and innovation partnerships to find common answers to the challenges related to interoperability of transport management systems, sustainable low-carbon fuels, security and safety."

Intelligent Transport Systems (ITS) are seen as a major tool when challenging transport policy goals are addressed. Therefore, the EU defined an ITS Directive and ITS Action Plan laying down the framework for the deployment of intelligent transport systems in the field of road transport and interfaces with other transport modes. The main challenges to be solved in road transport include:

- Congestion
- Safety/fatalities
- CO2 emissions, which are especially emphasised.

The first Intelligent Transport Directive (2010/40/EU) and its Action plan direct the development of functional, technical and organizational specifications for interoperable trans-European intelligent systems. The first set of key services includes transport and passenger information, the eCall emergency communications and the safe and intelligent truck parking. In particular, the Directive aims to standardize data and information transmission for service providers and authorities for harmonised services cross-border facilitated by the relevant authorities, stakeholders and the relevant ITS service providers. The Directive also mentions the need for continuity of services, in particular on the TEN-T network. Russia is not specifically mentioned, but Russia and the EU have common ITS research projects in e.g. eCall and in SIMBAII[8] projects.

ITS has great potential. Estimations have it that ITS may be able to cover between 5...-20% of transport problems we are currently dealing with. Technical development in the field of ITS is fast, but the uptake, however, is slow and fragmented, and lacking interoperability and effective cooperation. ITS actions are directed to six priority areas: 1) Optimal use of road, traffic and travel data, 2) Road safety and security, 3) Data

7 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52011DC0144:EN:NOT
8 http://www.simbaproject.org/

protection and liability, 4) Continuity of traffic and freight management, 5) Integration of vehicle and transport infrastructure and 6) European ITS coordination.

The TEN-T guidelines[9] (Trans European Transport Network) have been steering the European Union transportation policy since 1996. The current version of the guidelines was released in 2007, and the next update has been in preparation since 2009. Regarding the Smart Transport Corridor (STC) project, TEN-T encourages member states to develop multi modal transportation systems and fosters cooperation with countries outside the Union when developing transport networks.

The TEN-T guidelines address intelligent transport services in several articles. For example, in article 18, positioning and navigation services are considered to be part of the TEN-T infrastructure.

In article 9, traffic management, user information, dealing with incidents and emergencies and electronic fee collection, are considered to belong to road traffic infrastructure. These intelligent traffic services are developed for example in the EasyWay project.

The TEN-T guidelines define intelligent traffic services for shipping in article 16 as follows:

a) coastal and port shipping management systems;
b) vessel positioning systems;
c) reporting systems for vessels transporting dangerous or polluting goods;
d) communication systems for distress and safety at sea.

The most relevant TEN-T priority project for the Smart Transport Corridor project is the so called Nordic Triangle, where the most actual project is the upgrade of the E18 road into a motorway. Of the TEN-T network seaports Hamina, Kotka, Helsinki and Turku are pertinent to the STC project.

Freight Transport Logistics Action Plan[10] from 2007 (revised in 2010) defines the concept of eFreight, which refers to a Europe-wide paperless and traceable freight transport information management. In addition to information systems used on marine and rail transportation, the Logistics Action Plan observes the slow deployment of intelligent systems for road transportation. The plan also draws attention to the fact that navigation systems, digital tachograps and electronic tolling systems could considerably improve the operation of logistics networks in Europe.

The Logistics Action Plan stresses the environmental impact of logistics and encourages the use of ICT for the development of environmentally friendly Green corridor transport corridors. The Helsinki –St Petersburg Smart Corridor could be a part of, or continue the so called HelGen Green corridor: Helsinki-Turku-Stockholm-Oslo-Göteborg-Malmö-Copenhagen-Fehmarnbelt-Milano-Genoa.

The intelligent transportation systems to be piloted on the Helsinki - St Petersburg smart corridor should be compatible with European-wide traffic information systems like the European Rail Traffic Management System (ERTMS), the European platform for maritime data exchange (SafeSeaNet) and Intelligent Transport Systems (ITS).

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9 http://ec.europa.eu/transport/infrastructure/ten-t-policy/legal-basis/doc/guidelines/brochure_guidelines.pdf
10 http://www.connect-project.org/fileadmin/download/Freight_Logistics/LogisticsActionPlan.pdf

2. Vision of the Smart Transport Corridor

The aim of the Smart Transport Corridor project is to improve sustainable mobility and the flow of goods between Helsinki – St. Petersburg by utilising the most modern technology and products and services available. The project also supports the development of new business opportunities by introducing new concepts and technology. The target is to integrate all modes into a fluent and safe transport system, Smart Transport Corridor, which efficiently serves all travellers and hauliers. Smart solutions will be introduced to the main identified problems in the corridor, such as safety, border crossing, logistics, traveller support, and professional transport.

It is very important that Finland and Russia share a common view of the Smart Transport Corridor. Therefore, the parties will create a common vision and definition of what the aims of Smart Transport Corridor developments are geared to. This definition, together with more technical specifications on e.g. standards and codes used as well as open access interfaces, will establish a solid ground for the further development of Smart Transport Corridor systems and services.

The vision:

> *The traffic and travelling between Helsinki and St. Petersburg is safe, secure, smooth and sustainable. Real time information and management of traffic and transport, weather and other conditions is provided to all hauliers and travellers, before and during the journey, for all modes of transport. The available services cover all user groups, the authorities as well as private and professional business users. Crossing the border is smooth and efficient, the release time of goods and the waiting time for the people queuing at border crossing posts have been minimized.*

3. Objectives

The main objectives of the Smart Transport Corridor development are:

- To enable smooth, safe, secure and sustainable mobility and transport on the corridor and to improve border crossing operations effectiveness.
- To introduce smart services and solutions based on advanced measures and technology in problem solving for the fulfilment of various user group requirements and needs.
- To define an infrastructure for collecting and managing the data as an open platform for all stakeholders and users to enhance the take-up of intelligent services and advanced traffic management.
- To enhance cooperation between public and private stakeholders in both countries in solving the transport problems in the corridor and utilising the emerging business opportunities and fostering the growth of economies.
- To increase competences, skills and know-how of Intelligent Transport Systems deployment in both countries.

Figure 1. General objectives for the Helsinki-St. Petersburg Smart Transport Corridor.

The objectives above will be reached by utilising the possibilities of Intelligent Transport Systems and Services in all transport modes and their combinations, in order to fulfil the needs and requirements of authorities, business, travellers, operators and other relevant stakeholders.

Existing standards, guidelines and architecture frameworks developed for interoperability of the smart transport corridor multimodal services will be used as tools for implementation; to open interfaces for new business opportunities for companies; promoting cooperation between Russia and Finland; in order to develop business, and logistics and harmonise services for international trade, tourism and environment.

The objectives are refined into coordinated practical and interoperable measures, such as open data, interoperable interfaces, which will further develop the range of Smart Transport Corridor services in various areas of cooperation on both sides of the border.

4. The Smart Transport Corridor Concept

The Smart Transport Corridor concept is defined according to the agreed objectives by anticipating the needs related to expected developments e.g. in travelling and transport in the corridor.

The basic elements of the Smart Transport Corridor are

Stakeholders, including end-users:

- Service users
- Authorities
- Service providers

The Smart Transport Corridor concept is based on the user perspective and user needs and requirements for corridor systems and services. The users are a large group consisting of private and business travellers, business operators, service providers and public sector.

Stakeholders of the Smart Transport Corridor services development include authorities, companies, research institutions and of course different user groups. Authorities and the business sector both have dual roles as service providers and service users. In the transport sector, authorities are usually responsible for infrastructural and basic services offered to all users guaranteeing safety, security, access and sustainable travelling. In principle, their service provision is limited to those required by virtue of a legal requirement either in national law or international convention.

Infrastructure:

- Built infrastructure (traffic infra + services)
- Information infrastructure
- Data communication infrastructure

The second part of the concept consists of infrastructural elements such as traffic infrastructure and related services, which are physically built by authorities for the corridor users and services providers. Other infrastructure elements are information and data communication infra that provide a platform and enable service creation, deployment and delivery.

Operation models and services (only common models):

- Authority services (statutory)
- Business, commercial services
- ITS service and development categories
- Open data principle
- Cooperation and partnership models

Service creation is the key aim of the Smart Transport Corridor development. New services can be created by building on existing information and data structures to by find new ways and means to utilise and refine information in databases and repositories. However, this requires availability of information for developers, open interfaces and new operation models in both respective countries, in order to allow equal service base, as well as the formation of an entire business ecosystem around the corridor. Hence, it is important to agree on the common principles for the operation. Authorities might outsource some of their information services by contract to the private sector players, yet it is important to bear in mind that also in this situation the responsibility and rights for the data and information remain the authorities. Interconnectivity is also a very important factor for the successful implementation of services and utilisation of existing and available information. A favourable environment for interoperability is encouraged and established between authorities as well as between authorities and business in both directions, wherever the service development might so dictate.

Governance

The general governance of the Smart Transport Corridor is the responsibility of the Ministries of Transport in respective countries. Interconnectivity is also a very important factor for the successful implementation of services and utilisation of existing and available information. In order to enable the governance and steering of cross border services, and to define a favourable environment for interoperability, a co–operation body is encouraged to be established between authorities as well as between authorities and business in both directions, wherever necessary to ensure service development.

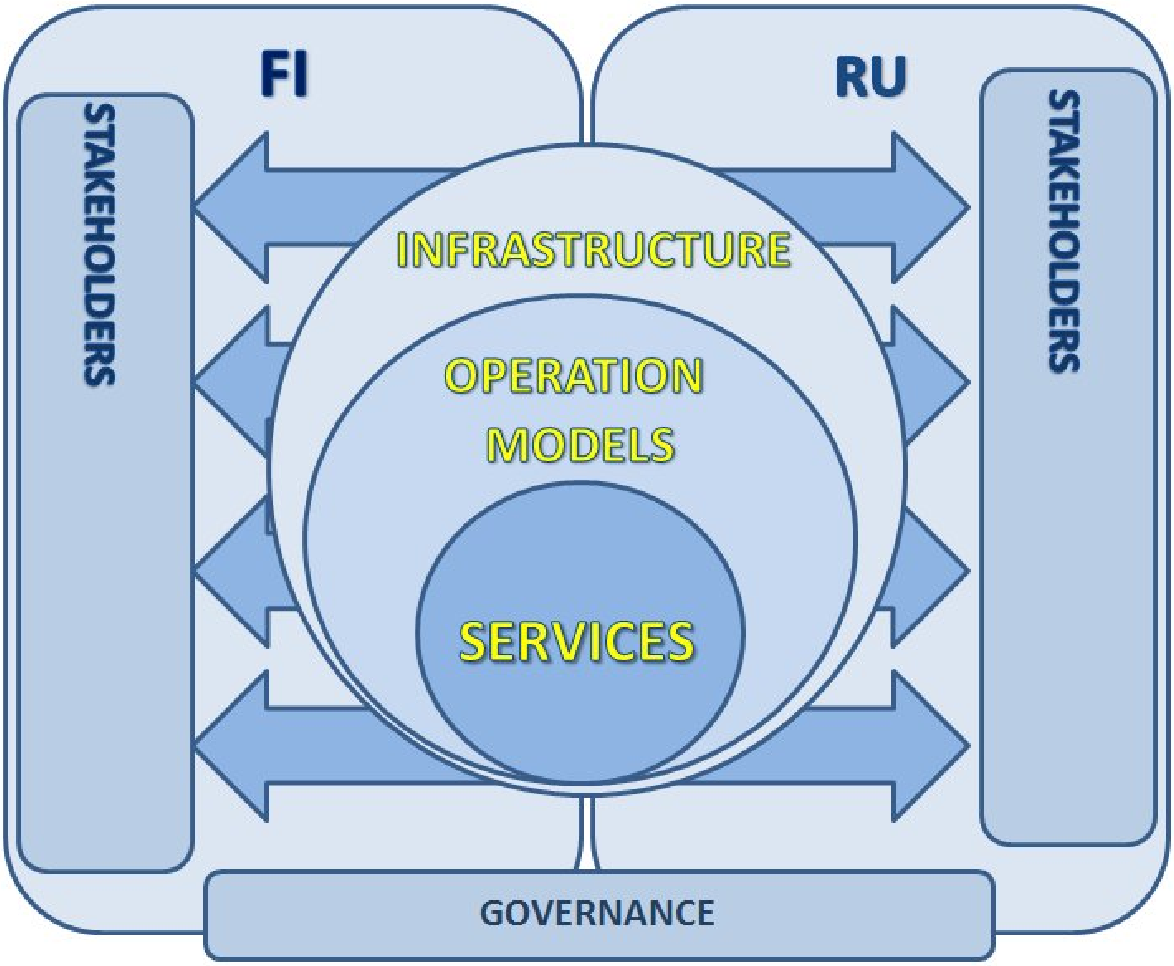

Figure 2. The basic elements of the Smart Transport Corridor concept

5. From vision to services

As defined in the objectives (Chapter 3) of Helsinki-St. Petersburg Smart Transport Corridor (STC), it is expected to improve traffic flow, safety and security and move towards a sustainable transport system by promoting interoperable and integrated Intelligent Transport Systems & Services in both countries and across the border by creating needed new services and traffic management. The process of the STC concept is presented in Figure 3.

The general concept framework for Smart Transport Corridor Services starts from the end-user and other customer needs, objectives and vision creation. The next step is to identify the stakeholders and relevant actors in both countries in order to start to negotiate and build the cooperation. The Smart Transport Corridor project addresses the transport corridor as a whole, starting from present situation, plans and needs of different stakeholders in different transport modes and building new services as much as possible utilising open technology.

The key actors include road, maritime and railroad authorities, together with leading ministries, border-crossing authorities like customs and immigration and the whole private sector including hardware, software and content enterprises, mobile operators, service providers, logistic companies etc.

When concrete business plans are starting to take shape, the focus is on financing and procurement issues and the relevant business models. The companies and authorities involved provide the needed data and technology platforms, and the participants agree on which standards the services are based. All these developments should also be integrated to existing legacy systems. New services for the whole transport chain may be created by combining data from different existing systems e.g. monitoring and facilitating the containers' path from ships to port and from port to border crossing.

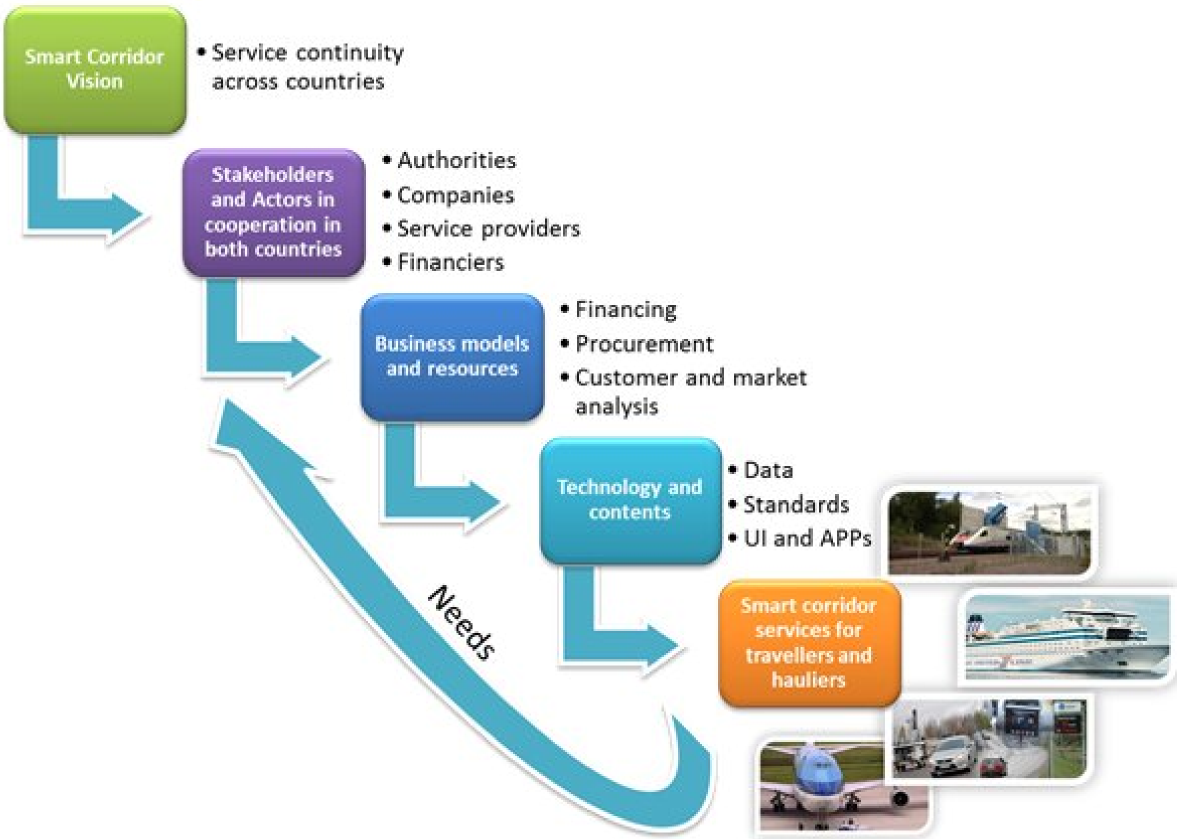

Figure 3. Concept creation for STC services

5.1 Smart corridor vision

The Smart Corridor vision, which was presented in Chapter 2, is the target and motivation for the service creation. The Services for Smart Transport Corridor need a Concept that includes all the transport modes and hubs as well as delivers seamless services for travellers and freight forwards and operators. Transport nodes and terminals are operating as mode change sites and thus require special consideration and intelligence, because they are interfaces to other modes, for example from road to rail. Border crossing areas and functions are also included in the concept, and have special operators with their own process and information needs, which serve both personal and business travellers and operators.

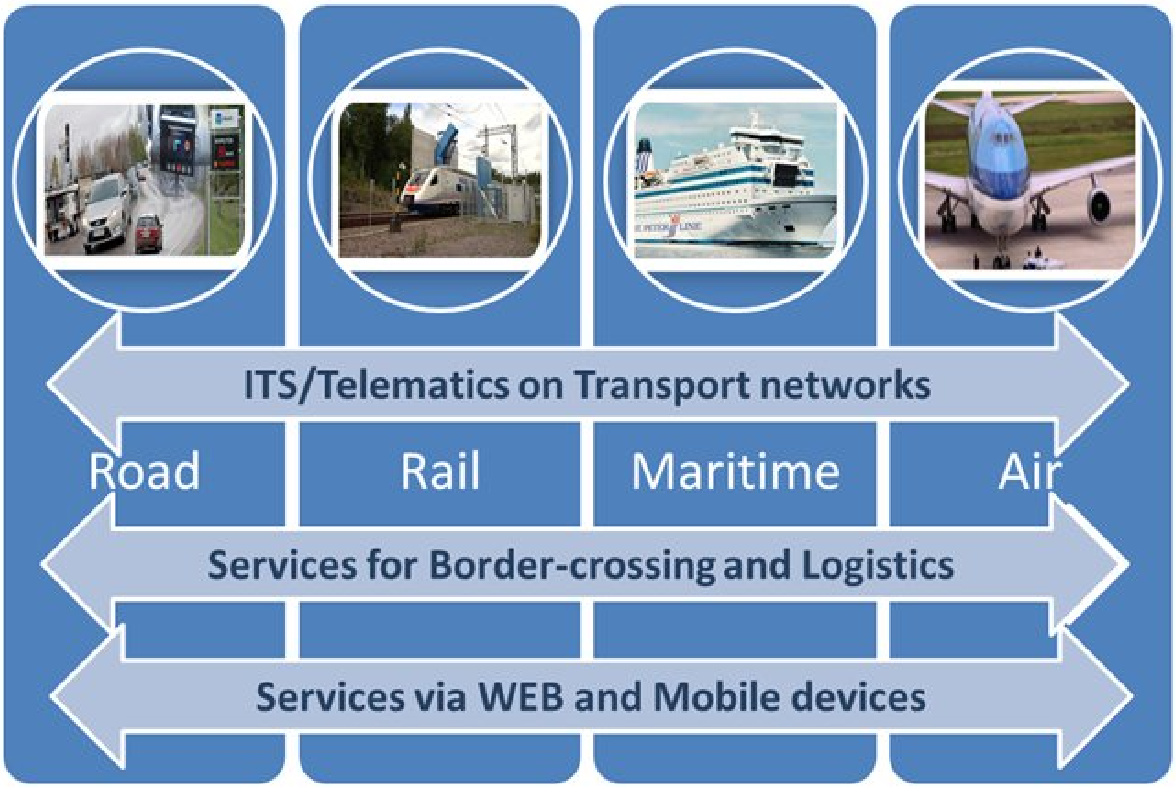

Figure 4. Seamless transport system and services.

ITS services are supporting the development of a seamless mobility system (Figure 4.) in the corridor relaying on a co-modality principle where each of the transport modes are utilised in their best areas. The ability to serve different customer and stakeholder needs with the synergic transport system and services is the most important aspect.

The co-modality principle also implies that sustainability is taken into consideration, meaning less pollution and energy consumption. The goal is to have road-rail-maritime-air infrastructures and services are integrated into an effective transport service system with advanced technologies utilising ICT-platforms.

5.2 Stakeholders and actors

An intelligent transport service ecosystem is a complex network of different stakeholders in various roles, with different needs and requirements. The interest groups can be divided into service users and service providers, while many interest groups may be at the same time the both; users and providers. For example, a local municipality may be a service provider, a data source for several commercial service providers as well as a service end user – all at once.

The Smart Transport Corridor Concept has to be user driven and serve all corridor user groups. In addition, the concept should be able to open opportunities for business development and to regions along the corridor in both countries.

The service development process starts from stakeholder requirements and needs. Examples of Stakeholders are listed in following table (Table 1.).

Smart transport service users	Service developers and providers	Service facilitators
• Transport companies and hauliers • Passengers • Car drivers • Road/rail operators and maintenance • Ports operators • Authorities	• Private companies • (Rail)road operators • Public authorities • Cities and regions • Local municipalities • Local entrepreneurs	• Telecom operators • Local municipalities • Car industry • Funding related organisations • Software companies / developers • Data integrators

Table 1. The service development process

There are several challenges and objectives regarding the development of traffic, transport and related services between Helsinki and St. Petersburg, and Finland and Russia naturally approach the issue from their own point of view. All stakeholders agree that the fluency of traffic and better knowledge of services and travel times are important in both countries and in crossing the border. More complicated issues among stakeholders are the visa policies and procedures for electronic data exchange between border authorities. The development of mutually beneficial intelligent transport services requires an open dialogue on common and individual challenges and objectives identified by both parties.

In order to start the development of a new Smart Transport Corridor service from an idea and/or user need, some basic studies need to be made, in addition to resolving certain issues. These steps include, but are not limited to, clarifying legal issues, defining the required data, mapping external interfaces needed to implement the service and the availability of the required information.

The evaluation of the environmental impact of the solutions and services shall be included in every project plan and implementation, as one of the main targets of Smart Corridor Services is to improve the sustainable mobility and flow of goods. Experts of environmental impacts and transport economics may also be needed in the process.

Demands of smart transport service developers and providers must also be taken into consideration. They require access to relevant information, such as weather and traffic flow data on both sides of the border. Open data is one of the key facilitators and preconditions of smart transport services.

5.3 Business models and resources

Developing viable Intelligent Transport Services requires a comprehensible business plan, which addresses, among other things, financing and revenue models, environmental impacts and traffic safety impacts. In addition, any ITS business plan should consider export possibilities to international market.

The resources and financing for the piloting and smart traffic services may come from, for example, the following sources:

1. State and/or communal authorities allocate resources for ITS investments and operations
2. State and communal authorities jointly finance the services together with commercial partners (a so called Public-Private-Partnership)
3. Pure business resourced services

The deployment of ITS is carried out according to national ITS strategies. For example in South-Korea, the state and the Metropolitan Areas subsidise the start of the services and then after a few years of piloting, when the service ecosystem is mature enough, the business step in and ensure continuity and the deployment of the services. In many countries the good practice for the procurement of ITS is the following:

- Roadside Equipment, Traffic Management, Traffic Safety related services and Enforcement are planned, procured, financed, supervised and maintained by state and/or communal authorities on the network and roads/streets that they own
- ITS services for Public Transport are usually provided by the Public Transport Operator in cooperation with the network owner (e.g. railway maintenance and operations belongs to the state and train services to the train operator; traffic signal priority for buses is operated by the communal authority and information services like the journey planner and next bus information displays on stops by the Public Transport Operator)
- Mobile ITS services in Smart Phones, Navigators and other PNDs can be fully financed by device sales, advertisements, licenses or other sources (e.g. as the smart transport services of Google, TomTom, Nokia etc.) – this is the most complex area
- ITS and services provided by car industry are based on normal private business agreements where the car industry partner is typically the key developer.

In Smart Transport Corridor services and piloting resources and operation model can be the following:

- Roadside equipment, Traffic Management, Enforcement, Safety related information by State and Communal Authorities
- Data and information delivery from previous equipment (together with the necessary interfaces) from State and Communal Authorities to 3rd parties (internet, radio and mobile services)
- Border-Crossing services mainly by Authorities + information delivery for 3rd party services (internet, radio and mobile services)
- Internet and Radio services with PPP model (Public-Private Partnership)
- Public Transport Services with PPP model (Public-Private Partnership)
- eServices for Logistics with PPP model (Public-Private Partnership)
- Mobile services as Multi-Services - by service value-network delivery in cooperation with Smart Transport Service Providers and different local and nationwide tourism, retail trade, service station etc. stakeholders for free and premium ITS services for end-users. Note: Mobile services can provide crowdsourcing data for the authorities.

Together with business models and financing, the transport economics and impacts can also be studied. Impact calculation of different plans give needed background information for choosing the right and most effective plan. Sustainability and environmental impacts may include reduction of fuel consumption and greenhouse gas emissions and result in a diminished number of environmental accidents and better informed rescue response to them. Traffic and transport safety impacts include reduction of human injuries and deaths, as well as material losses.

Reduced emissions and environmental accidents may also have health effects, including a reduced number of lung diseases. For example the IMO MARPOL general agreement for Sea Traffic, which defined Baltic Sea, North Sea and English Channel as Sulphur Emission Control Areas, has been estimated to reduce the number of premature deaths by 50.000 every year.

Also a study of legislative limitations and barriers would give important information for business planning.

5.4 Technology and contents – prerequisites for functionality

ITS architecture usually contains service descriptions, logical architecture and standards. The service descriptions are the base for the architecture. For the reference, the complexity and possibilities of Smart Transport Corridor's Intelligent Transport Systems and Services can be seen in the logical architecture of possible services.

The logical architecture does not explain who is providing which part of the system. Instead, it shows the processes; connections and the main data contents between the tasks (see the Figure 5.).

In addition, a physical architecture for the pilots of the Smart Transport Corridor will be defined during the project. Physical architecture defines the physical subsystems (servers, communication means, user interfaces, data storages etc.) and the needed interfaces between the subsystems and processes.

In ITS, there are several different processes, which can function at the same time and also use the same raw or converted data in real-time. For example the same data can be used to

- trigger the road operator's maintenance activity to clear the road from snow and
- operate the road side variable-message signs e.g. to lower the speed limit and
- alert the drivers of difficult road conditions via different media (e.g. by broadcasting, by smart phone, by RDS-TMS device, by private radio network that is used by public transport fleet management etc.).

It is essential that different processes can use the same data and share it for different needs. The characteristics of successful large systems are compatibility, expandability, interoperability, integration and standardisation. A good example of this is public transport, of which all main processes (smart ticketing, traveller information systems and the fleet and driver management) are nowadays planned, operated and maintained as integrated systems.

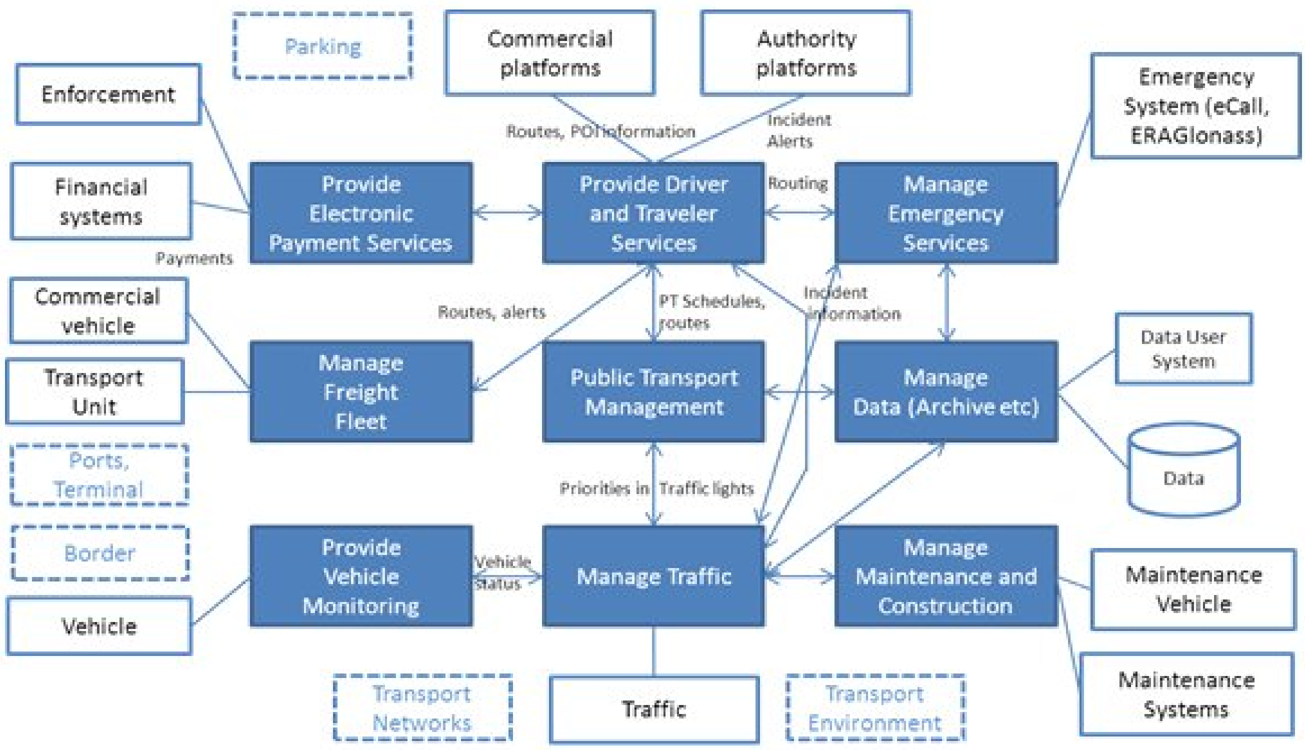

Figure 5. Smart Transport Corridor’s ITS logical architecture (high level example).

Interfaces, Standards and Codes

To achieve the vision introduced in the STC roadmap through the interoperability of information systems and services, there is a need for a definition and a mutual agreement on certain procedures and practices related to the presentation of information and implementation of standards and codes as well as availability of information.

Many smart corridor services are, to a certain extent, based on standardised technologies, like RFID. However, the technologies and standards utilised are not always used in identical manners as there are different ways to implement and interpret the standards.

Within the existing smart corridor services there is low level of general agreement on the standards and format of exchanged information as well as interfaces with other services. At the moment, most smart corridor related services tend to be stand-alone and operate in isolation from other services. This is slowing down the development and utilisation of the service portfolio among the smart corridor users.

The utilisation of standardised code lists could provide remarkable effectiveness and uniformity for smart corridor services. Furthermore, the implementation of standard code lists does not necessarily require the simultaneous renewal of documents or their data contents. The main benefits from the use of standardised code lists are results from deduced number of errors and need for interpretation of data as well as from increased speed and timeliness and reusability of information. The international standard code lists can be utilised in smart corridor services as well as in the documents related to commercial and authority information exchange.

- tools (e.g. standards) to gather the data and information (both common and special)

- tools (e.g. standards) to integrate and process the data and deliver the services for the users and stakeholders (including the interface and API definition)

In the context of Smart Transport Corridor, a project on interfaces, standards and codes in data communication between Authorities will be implemented. This project is concentrating to define the interfaces and representations as well as data interchange between authorities and other information sources through the first STC pilots (category I). The results of this project as well as other related projects for Transport Forecast are published as appendixes to the STC project final report.

Smooth cross-border transport services require data sources from traffic authorities, weather services and private service providers to be easily accessible from both sides of the border to develop innovative new services. Otherwise the burden of identifying the relevant authorities, negotiating the data release contracts and creating the application programming interfaces becomes insurmountable.
There are several prerequisites to creating a new service, including, but not limited to:

- The specification of the basic/common data for the services
- Data ownership, security, safety and privacy
- Identification of additional /special data and information for special services for different groups (authorities, private car drivers, travellers, hauliers, companies etc.)
- Identification of the sources for the data (both common / special)

The first thing between interoperable services and open data provision is to define and agree upon interfaces for data retrieval as well as standards and codes used in information exchange. This definition and agreement is also of major importance in order to establish a solid platform for further development of smart corridor services as well as for innovation and the creation of new ones.

When this information is correlated with a survey of Finnish and Russian traffic service developers' needs, we can deduce which data repositories should be opened first for general use. Information on the available data repositories is to be collected on a cross-border STC data catalogue depicting the data with corresponding access licenses and technological definitions. This data catalogue provides an easy access point for companies and authorities looking for data resources they need.

International studies have shown that open access to public authorities' data repositories fosters innovation and growth of particularly small and medium sized companies that can utilise the data in their service production. In addition, it has been found that public authorities' own knowledge management intensifies when they become aware and get easy access to each other's data repositories.

In order to facilitate development of new cross-border transport services, public authorities on both sides of the border are required to open their relevant databases for general use without legal or technical limitations. Both the data release licenses and the application programming interfaces should allow free utilisation and reuse of the data. Hence, the interoperability with these legacy systems interfaces is normally a requirement for Smart Transport Corridor services.

5.5 Smart transport Corridor services for travellers and hauliers

The availability of the services, on an equal level and across the border is of major importance for the user experience. The seamless interoperability of services attracts the passengers and professional hauliers to utilise these services and encourages further development of smart corridor commercial and public services.

There are special needs among different end-users such as tourists and business travellers, business, authorities managing the processes and all kinds of companies either serving or supporting the services process.

For example, traffic and queue situation awareness is important for both the border authorities and passing travellers and hauliers. There can be special dedicated services for the whole freight chain: monitoring and easing containers' path from ships to ports to border crossings etc. with data from different existing systems. For tourists, the information of public transport choices, attractions on route and in the destination, route choices, parking possibilities and services on the way are important.

Services for a car driver (the logical component "Provide Driver and Traveller Services") could include, for example:

- Pre-trip travel information (weather forecasts, different route choices etc.)
- En-route driver information like Route Guidance and Traffic Information
- Ride Matching/car pooling and reservation
- Traveller Services Information (Points of interest, ads etc.)
- Traffic Control (speed limits, warning signals on board etc.)
- Incident Management (alerts, by-pass routes etc.)
- Emergency services (eCall etc.)
- Travel Demand Management (road tolls, fuel taxes, parking fees etc.)

-

The respective services for a truck driver could be:

- Pre-trip travel information (weather forecasts, different route choices etc.)
- En-route driver information – optimising the transport route according to the freight and delivery and for the specific type of vehicle (weight and dimension limits etc.)
- Fleet and freight management Services
- Traveller Services Information (personified for a truck driver)
- Traffic Control (speed limits, warning signals on board etc.)
- Incident Management (alerts, by-pass routes etc.)
- Emergency and safety services
- Border crossing services
- Road Network Demand Management (truck tolls, safe truck parking etc.
- WIM and other road-side inspections and supervision, emission testing for restriction of access for certain areas etc.

Smart Transport Services require Internet access. Therefore telecom operators on both sides of the border have to be involved in their development. Connectivity to services has to be available everywhere in the Corridor. An agreement between Russian and Finnish telecom operators is recommended in order to keep roaming fees at an affordable level, so that Finnish and Russian mobile service users can utilise services provided in both countries without fear of exorbitant costs, irrespective of which side of the border they are.

The idea is to combine both static data (transport infrastructure related data, timetables for traveller, routes, maps etc.) and dynamic data (positioning data of vehicles, transport flows and traffic data, weather data and forecasts, roadwork, road and railroad maintenance and incident information etc.) for real-time ITS services that provide information for traffic management centres and maintenance operators and end-users on the road. (Example of different information needs for different use in Figure 6.)

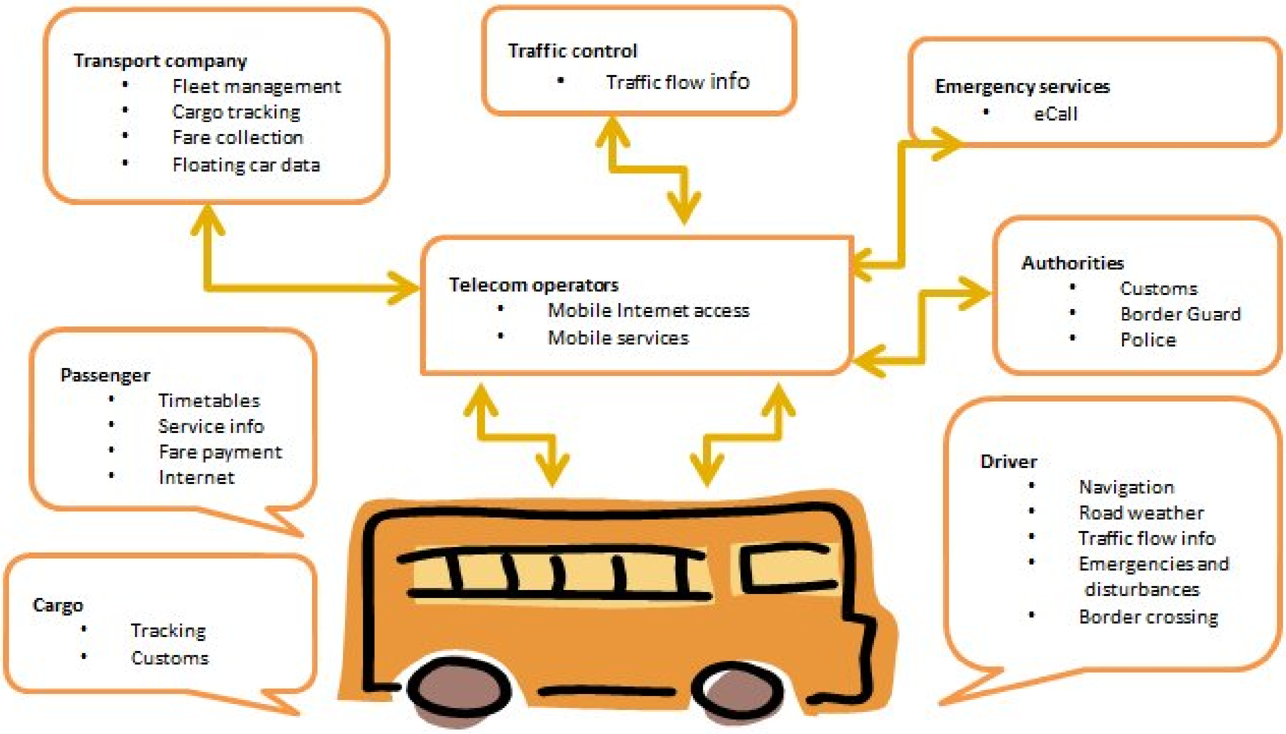

Figure 6. A bus travelling along the Smart Corridor, transporting passengers and cargo, illustrates the variety of different stakeholders involved and the intelligent transport services they require.

Road users are interested in road conditions, the weather, traffic flow and border queue information. Especially tourists, passengers and vehicle drivers require information and access to different public transport alternatives, roadside services, lodging and attractions. End users accessibility and ease of use are especially important in these services.

Services should be available on different platforms from smart phones to navigators, and they should operate seamlessly on both sides of the border. In addition to Russian, Finnish and Swedish, the services should be available in English and other languages found necessary for the end users.

What is more, different public and private organisations require smart transport services. Transport companies want to manage their fleets and track cargo, road operators need to follow traffic flow, disturbances and emergencies, and customs authorities require information on traffic flow to manage their resources and so on. For public and private organisations, accessibility and service reliability are paramount.

In order to constitute a comprehensive smart transport service environment, the various services have to be compatible. The end users must be able to access them with a single or few applications and platforms.

6. Smart Transport Corridor pilot services

6.1 Validating the concept

The main objective of the STC-project is to define the new concept and the first steps towards the implementation of the defined concept. Smart services implementation is the final phase of the innovation chain in intelligent transport system deployment. The systematic approach includes the R&D-phase, solutions, demonstration, piloting, full operational testing and market entry preparations.

The first phase includes four pilots that are seen to be most urgent and taking into account the requirement of the fast introduction. The first step in the implementation will test and validate the STC concept and operation models in developing interoperable services in the corridor.

Rather than piloting individual services, the first phase pilots' focus will be in testing the concept itself. Among other things, testing will also include piloting of the potential business models and usage of the open data owned and collected by authorities.

General principles and framework for co-operation with authorities should be established. Even the testing of services could be implemented as individual projects.

A good co-operation with different authorities, agencies and companies across the border is crucial in order to create and establish a functional test area. Therefore, during the piloting, a model will be established to facilitate dialogue between Finnish and Russian authorities and companies on ITS related topics.

An important task for the test area arrangement is also to keep up awareness and information on the results and experiences of other development projects related to the Smart Transport Corridor. Within this context, the information on lessons learned by other projects could foster the continuous development and be a catalyst for new innovations.

6.2 Services development and pilots

Preliminary plans for the first STC-pilots have been developed during 2012 (Chapter 7.1 Phase 1 pilots). These pilots are planned to be launched for end-users in 2013. One of the goals of the phase 1 pilots is to make the most out of existing services and data sources resulting in new, multi-modal services for private and business users and authorities.

The first pilot phase concentrates on road traffic. Pilots for other transport modes will be gradually taken on-board. These additional, phase 2 pilots, will be identified during the project and a roadmap will be defined for the implementation of these pilots during the following years. The roadmap will be an evolving document which is periodically updated.

The process for choosing the future pilots starts with identifying the needs, suitable technologies and finding the actors for providing the services. Plans of transport related stakeholders and authorities – both on-going and upcoming – will also naturally influence the pilot roadmap development process.

Some criteria for choosing the services and related pilots to be implemented include, but are not limited to:

- Balance between means of transport: There should be pilots for road, railway and maritime sectors
- Service compatibility and continuity: During the pilot it should be verified that the service is available throughout the corridor and works in a seamless way for both Russian and Finnish users in the corridor both sides of the border
- During the pilot it should verified that different services (pilots) can mixed and integrated with each other enabling development of new services utilising old ones
- Pilots need to comply with the overall conceptual framework described earlier in this document
- At least one of the pilots should provide means for more fluent border crossing between Finland and Russia

- Potential to replicate the pilot / service in other corridors.

For each of the pilots on the roadmap, the following definitions need to be developed

- Goals of the pilot – what are the problems to be sorted out
- Relevance of the pilot in the corridor context (pilots on a national level are executed separately)
- Key use cases
- Technology building blocks and related interfaces
- Target schedule (when the pilot is carried out)
- Estimated budget
- Stakeholders and their roles and execution environment (who are using the service, who is running the service, what data sources are needed to execute the service etc.)
- Potential to replicate the pilot / service to other possible corridors

6.2.1 Requirements for Open Data

All services / pilots presume the use of existing information resources / opening of data sources both in Finland and Russia. It is proposed that during the pilot Finnish and Russian authorities will open the data and related interfaces only to the service provider(s) participating in the pilot and to the counterpart authorities in neighbouring country (Finland / Russia). However, at the same time it should be evaluated how and under which conditions interfaces could be opened to any interested party so that a number of new services utilising the same data sources could be developed. In this evaluation issues such as data ownership, intellectual property rights, technical capabilities (preventing overload), and restrictions of the usage for commercial use, etc. will be considered.

Interfaces should be open and in machine readable format. Data format, codes, protocols, etc. will be further specified and agreed on during the pilot planning and definition.

An “Open data –catalogue” on information provided by authorities and agencies should be made available free of charge, as well as list of sources making information and data available on a commercial bases. Also a definition of interfaces for the information should be made available for users by the host organisation.

7. Pilot Roadmap

The roadmap for Smart Transport Corridor development is based on the phased approach where the Phase 1 pilots (see Chapter 7Virhe. Viitteen lähdettä ei löytynyt.1 Phase 1 pilots for further details) will pave the way for the concept verification and adoption.

The outcomes of the project and the Phase 1 pilots will be demonstrated in Helsinki ITS Europe Conference, June 2014. After that the service implementation phase will follow by commercial stakeholders.

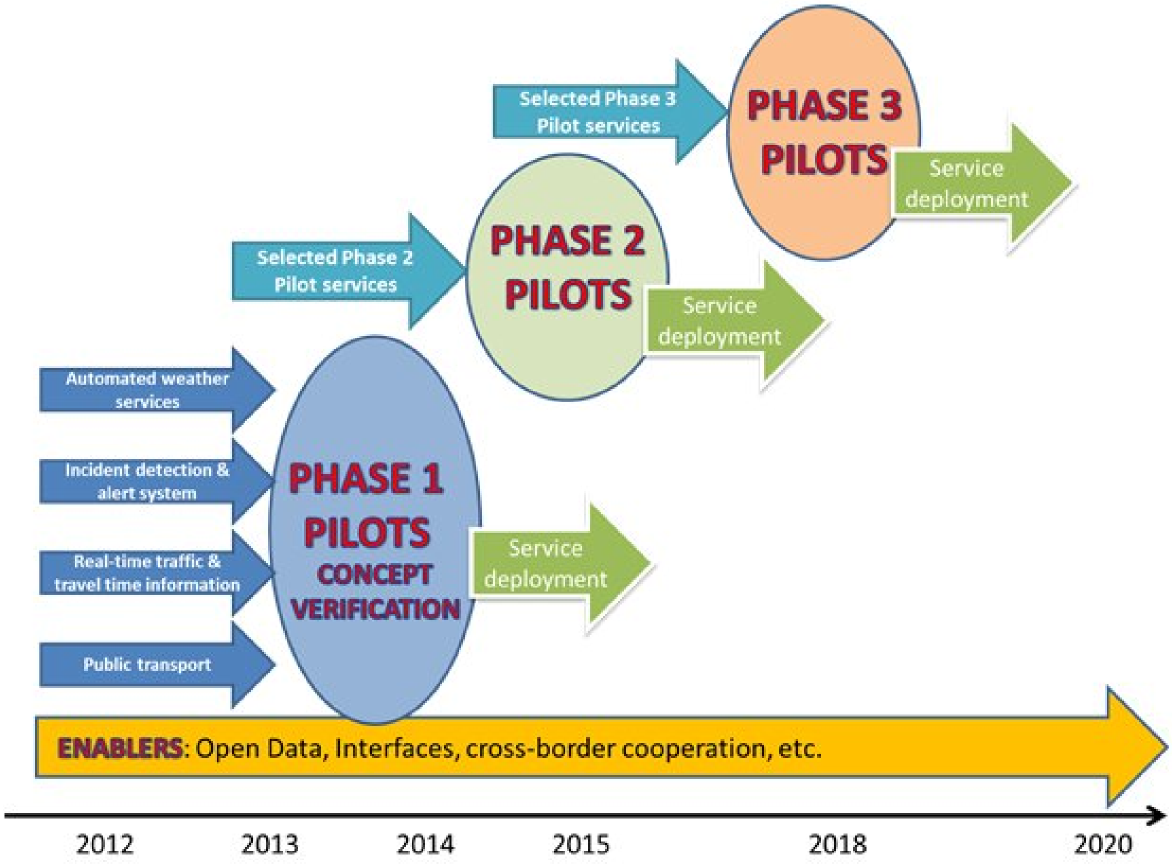

Figure 7. : Roadmap of the phased piloting and implementation steps in Smart Transport Corridor

Based on the first experiences from concept verification and implementation and even more importantly the user needs and requirements, the next set of pilot proposals will be chosen by the Finnish-Russian Project Steering Group. The pilots in the following phases can be selected among the candidates e.g. suitable to the scope of ITS development major themes and development areas.

7.1 Phase 1 pilots

Four priority pilots for phase 1 have been agreed on between Russian and Finnish Ministries of Transport (communiqué signed on the 14th November 2012 by ministers M.Sokolov and M.Kyllönen). These pilots are:

- Automated weather services
- Automated incident detection and alert system
- Real-time traffic and travel time information service
- Public transport information service and schedule calculation

With the exception of eCall – ERA GLONASS interoperability element of pilot #2 (Automated incident detection and alert system), all four pilots will focus on providing real time information for travellers (road users). There are also other elements, which are common to all pilots, such as:

- Use of open data: to be able to create the services for end users, data currently owned and administered by authorities must be made available for service providers and application developers

- Data exchange between Finland and Russia: to be able to have seamless services across the border, data (e.g. weather information) must be exchanged between countries (authorities)
- Service provider role: as it cannot be expected that authorities will take a role providing services directly to end users, there needs to be service providers both in Finland and Russia utilizing data obtained from authorities and other content owners (like train and bus operators) and offering services to road users. Figure 8 gives an illustrative example of the potential arrangement for pilots.

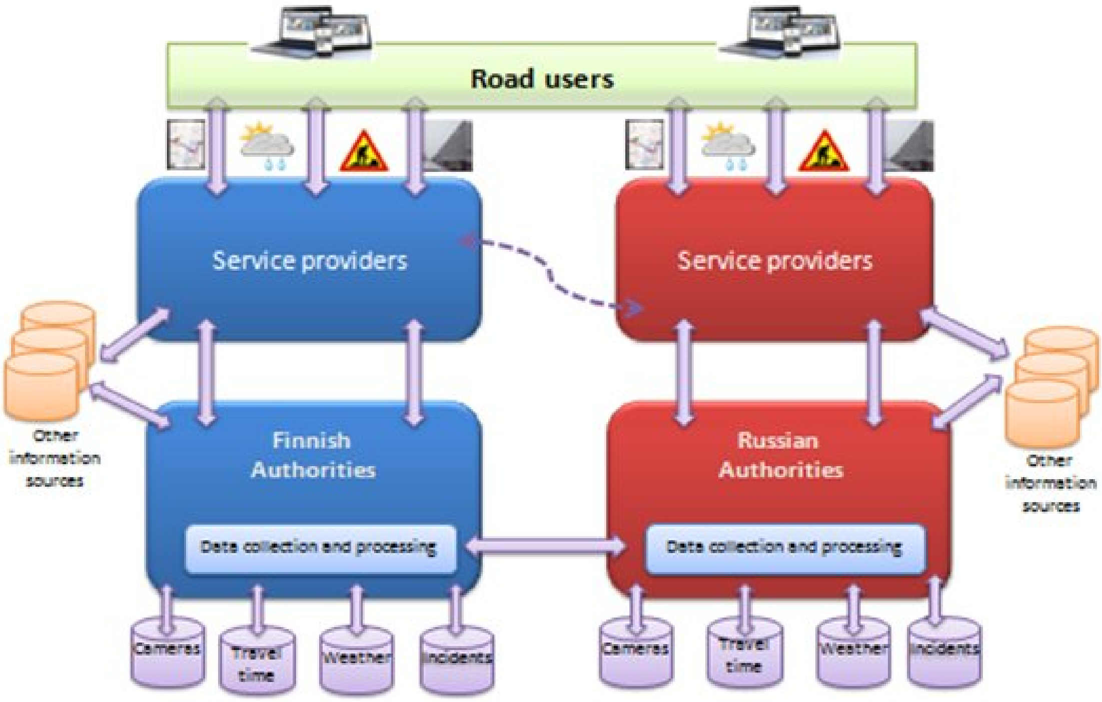

Figure 8. An illustrative example of the pilot arrangement

To implement the pilots in the most cost effective manner it is proposed that instead of running four pilots in parallel, pilots will be implemented in three steps, so that new functionality will be implemented on top of the previous step. The steps are defined in Figure 9.

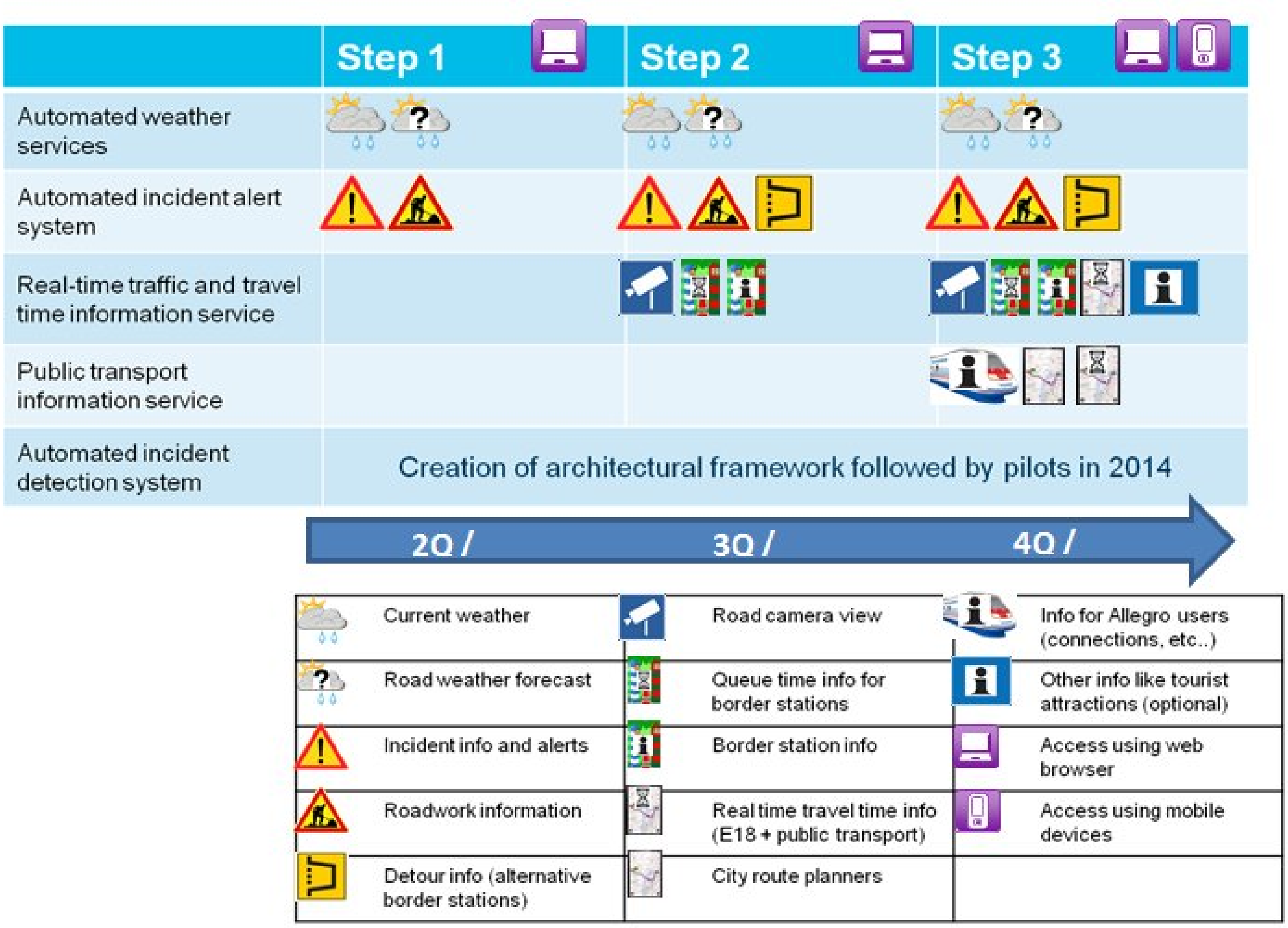

Figure 9. The pilot steps

The main content and objectives of the pilots are:

- Step 1 implements pilots #1 and #2. The objective of Step 1 is to verify that required data can be collected in both countries, data can be exchanged between the countries and new applications can be developed on top of the exposed data
- Step 2 implements the pilot #3: The objective of Step 2 is to test the concept with end users by providing consolidated real time information over web interface
- Step 3 implements the pilot #4: The objective of Step 3 is to introduce the role of the commercial service provider and verify the business aspects of the concept.

As discussed earlier, pilot #2 consists of two different areas; eCall - ERA-GLONASS compatibility and incident information for road users. While incident information for road users can be covered in Step 1 described above, it is proposed that eCall – ERA-GLONASS compatibility will be handled separately and executed in parallel to other pilots:

The Pan-European eCall system and service will be implanted in EU Member States and to all new cars in Europe from 2015 onwards. The same development has also been going on in Russia; the ERA-GLONASS service will be taken into use in new vehicles starting 2014 in Russia.

So far the focus has mostly been on defining and implementing the service on a national level. However, eCall has to serve the citizens all over Europe. Therefore, the interoperability and cross border functionality is of major importance and attention has to be paid on these functions and testing.

Today, eCall – ERA-GLONASS compatibility planning is in an early stage, and further action should be started as soon as possible. Therefore, it is proposed that an architectural framework for eCall – ERA-GLONASS cooperation will be defined starting in the beginning of 2013 followed by an actual interoperability piloting period. For details of the proposed architectural framework, please refer to the STC pilot description document in Annex 1.

A brief overview of phase 1 pilots is described below. For further details, please refer to the STC pilot description document.

7.1.1 Automated weather services

Two different user groups for automated weather services can be identified; road users (travellers) and authorities being in charge of road maintenance. In the first phase (priority pilots) weather services for road users are developed. In the second phase weather services for professional use can be added.

The goal of the pilot is that road users are able to check the current road weather data and forecast throughout the whole corridor between Helsinki and St. Petersburg. The weather information needs to be available for both Finnish and Russian road users, regardless of the road user's physical location (in Finland or in Russia). The primary methods to check the weather information or road condition (slipperiness) is either using Internet web browser (PC, laptop, tablet) or using mobile device like smart phone. In addition to normal use as described above, it should be possible to subscribe to a service to receive alerts for sudden road / weather condition changes. Alerts could be delivered e.g. to a mobile phone using SMS.

7.1.2 Automated incident detection and alert system

In the first phase pilot for incident information for road users will be implemented. The starting point is the same as with weather services. There are incident (road work, accidents etc.) information databases and services in both countries (maintained by authorities) but information between countries are not exchanged.

As with weather services, it is proposed that authorities or service providers will exchange incident information with each other and then make combined Finnish – Russian incident information available to service developers and providers.

The main use case is that road users will instantly and automatically receive information about incidents in the corridor area. Information about incidents can be delivered using the same channels as with weather services (Internet, mobile devices). Additionally, information about alternative routes can be provided but in the first phase alternative route information will include only information about which border crossing stations should be used. For re-routing within a country existing services will be used (like connected personal navigators).

7.1.3 Real-time traffic and travel time information services

As a result of this pilot road user will get real-time information about the traffic situation, travel time, routes, border crossing, parking etc. using internet or mobile devices.

In Finland rajaliikenne.fi web portal is the central place for information for travellers between Finland and Russia. The service is available in Finnish and Russian language and there is information e.g. about border stations, border crossing processes, queuing times at the border, road weather close to border, road cameras, incidents etc. Currently information is available only from Finnish side. The service is provided by Centre for Economic Development, Transport and the Environment of Southeast Finland.

As a practical implementation of this pilot it is proposed that rajaliikenne.fi will be further developed so that

- The portal will include the same information for the Russian side as today for the Finnish side
- The geographical area will be expanded to cover the corridor from Helsinki to St Petersburg
- Traffic fluency information should be added (for travel time service)
- The service will be made available also for mobile devices by optimizing the existing web pages for mobile use or by developing a dedicated client(s) for mobile devices
- Optionally an open interface for service developers and providers so that they can easily combine services available through rajaliikenne.fi also with other services

To implement the extensions mentioned above, several data sources must be made available both in Russia and in Finland. Although rajaliikenne.fi portal expansion is proposed as the next step, it is also recommended that also other portals in Russia and Finland will utilise the data source, which will be made available during this pilot.

7.1.4 Public transport information services and schedule calculations

Today, there are various tourist information and journey planner services available in both countries, but quite often they are addressed for users in their own countries in their own language. Another problem is service discovery. As various service developers have developed regional journey planners, it is difficult especially for foreigners to find such planners on the Internet. In addition, journey planners cannot typically combine border crossing public transport with national and regional public transport. Therefore, travellers between Finland and Russian can rarely fully utilise public transport when visiting the neighbouring country.

As a result of this pilot travellers receive information of different public transport alternatives and related services before and during his/her trip to the neighbouring country for both the long-distance trip and for the connective trips (e.g. for urban travelling in Helsinki and St. Petersburg). All information will be obtained as a “one stop shop” using a single service and related end user interface.

The focus of this pilot should be on the Helsinki – St Petersburg Allegro speed train. There are two main approaches for Allegro users. 1) make travel services available on the Allegro train (e.g. using WLAN when service discovery could be enhanced by introducing landing page which gathers information for travellers to single place) 2) provide information about connecting public transport lines for Allegro users.

Services to be included include, but are not limited to:

- Route planning combining different means of transport for most important routes like:
    - St Petersburg – Helsinki / Helsinki Vantaa Airport (Allegro Train – Helsinki City bus network)
    - Helsinki – St Petersburg / Most important tourist attractions (Allegro Train – St Petersburg Metro and bus networks)
- Metro and bus schedules and routes for St Petersburg and Helsinki (in Russian and Finnish) (development and further promotion of existing services like http://www.reittiopas.fi/ for Helsinki metropolitan area and http://transport.orgp.spb.ru for St Petersburg.
- Promotion of other portals providing public transport information

The services should be available in Russian and Finnish languages and like other services mentioned earlier in this document it should be possible to use the service both with mobile devices over mobile broadband and web-browser over Internet.

8. Conclusions and recommendations

8.1 Conclusions

The increasing cooperation between Finland and Russia reflects directly to transport activities, increasing travelling and traffic volumes on the corridors, ports, borders and terminals. To support this development, many initiatives are needed in the future to open new business opportunities and enhance well-being.

The Intelligent Transport Systems and Services (ITS) is a new tool that will be utilised in transport and which will offer many means to improve travelling and transport in cities, regions and corridors. In the Smart Transport Corridor (STC) project we have developed a concept aiming at solving the various problems encountered or forecasted in the Helsinki-St- Petersburg corridor.

The project teams have agreed that the Smart Transport Corridor Concept should include all modes of transport and ultimately integrate them into a seamless, sustainable and well-functioning system, consisting of all relevant services to different user groups. However, the development should start with road transport, which has major opportunities to deliver fast benefits to many users and operators.

Both Finnish and Russian relevant public and private organisations should obviously be involved in this cooperation to ensure success. In the starting phase the involvement of the public sector is of utmost importance because of its leading role in transport and ability to cater for prerequisites to business and other necessary operations. Experience has shown that the cooperation models should be developed both within countries and in-between countries.

There are several ITS services available in Finland and Russia, however, they are mainly implemented in national languages only and it is currently very challenging to find an appropriate services across and on the other side of the border.

The STC Concept should be dynamic and adaptive, so that new needs and opportunities can be integrated into the system when they are identified.

The development and implementation of the STC Concept has to be a step-by-step process, starting from the most urgent needs and areas where the prerequisites are identified and agreed upon by all of major stakeholders.

An open data approach is still in its early phases in both countries and cross-border data sharing needs common agreement. Hence, step-by-step access considerations and actions should be started from the most potential data sources owned by the authorities and the scope should then gradually be widened for service development in the corridor.

Launching the practical co-operation for the creation and implementation of concrete pilots and services is time consuming. Therefore the development of STC service show-cases for the ITS Conference 2014 in Helsinki should begin as soon as possible.

The Simultaneous projects have issued their own specific conclusions and recommendations available in the respective documents available as Annexes to this document.

8.2 Recommendations

The development of the Smart Transport Corridor continues, but the work in the planning phase of the STC development (from 2011 to 2012) of the Finnish consortium led by VTT ends with this deliverable. In view of the conclusions above, the Finnish consortium decided to recommend the following actions for the next phase.

The main recommendations for the STC development are:

- Define a common funding framework for required activities on both sides and ensure funding
- Define the procurement strategy and principles for achieving the STC services
- Define actions and the marketing strategy for the ITS Europe 2014 in Helsinki
- An "open data –catalogue" on information provided by authorities and agencies should be made available free of charge, as well as a list of sources making information and data available on commercial bases both in Finland and in Russia in order to gradually widen the scope for service development in the corridor.
- To create an effective governance and management model for STC in order to foster the good co-operation and coordination reached during the STC concept development on the national level. Some examples of co-operation and coordination tasks could be the creation of an annual action plan for STC development, as well as establishing a common information dissemination and education programme for STC development
- In order to enable the governance and steering of cross border services, and to define a favourable environment for interoperability, a co–operation body is encouraged to be established between authorities as well as between authorities and business in both directions, wherever necessary to ensure service development.

The main recommendations for the first pilot phase are:

- Organize implementation of each of the pilots taking into account their special needs
- Formulate a strategy, operation and coordination model for the first pilot implementation phase
- Define different roles and responsibilities of the pilot implementation organisations
- Ensure commitment of all relevant stakeholders and organisations for the first pilot phase
- Elaborate detailed pilot implementation plans for each of the pilots
- Formulate a communication plan for the first pilot phase

Liikenne- ja viestintäministeriö

ANNEX 1

Pilot Descriptions

Content

1. Introduction to the document

As described in the Helsinki – St Petersburg Smart Corridor Concept document, four priority pilots have been agreed upon between Russian and Finnish Ministries of Transport (communiqué signed on the 14th November 2012 by ministers M.Sokolov and M.Kyllönen). The objective of this document is to define the use cases from a service end user point of view, their relevance in the smart corridor context and also provide a definition to what is expected from the authorities and (other) stakeholders and data source owners, in order to enable the service development.

The document primarily describes the available data sources in Finland. Equivalent data sources are also needed from Russia, but the exact definition of such data sources is not within the scope of this document.

2. Pilot #1: Automated weather services

Two different user groups for automated weather services can be identified; road users (travellers) and authorities being in charge of road maintenance. Authorities need more detailed and accurate information than road users but typically weather information developed for professional use is used as a basis to develop services for road users as well.

In the first phase (priority pilots) weather services for road users are developed. In the second phase weather services for professional use can be added. The main use case for professional use is to include road weather information from the other side of the border and combine such information with local weather forecast when forecasting road condition change information e.g. to estimate need for road maintenance work (e.g. snow removal).

Priority pilots and this document will focus only on services for road users (travellers) but as in both scenarios (professional use and road users) data exchange between Russia and Finland is needed, the data exchange model developed for road user services can be later re-used when services for professional use is added.

2.1 Current state

At present, the road users do not have a coherent view of the road weather and related warnings covering the whole corridor. There are web-based services separately for Finland and Russia, but to see the weather and forecast for the entire route, the road user must know exactly from where the information can be found separately for Russia and Finland (e.g. http://szmeteo.ru/7555/meteotrassa/index_ru.phpand, http://www2.liikennevirasto.fi/alk/tiesaa/). In addition, there are limitations for mobile use and support for Russian language is missing in Finnish weather service(s).

Weather information is currently not exchanged between Russian and Finnish authorities.

For service providers and developers (providing services for travellers) it's currently difficult to know from where, in what format and under what conditions weather information is available to develop new services to cover the whole corridor.

2.2 Use cases

Road users are able to check the current road weather data and forecast throughout the whole corridor between Helsinki and St. Petersburg. The weather information needs to be available for both Finnish and Russian road users, regardless of the road user's physical location (in Finland or in Russia). The primary methods to check the weather information or road condition (slipperiness) is either using an Internet web browser (PC, laptop, tablet) or using a mobile device like a smart phone. For mobile use internet pages need to be mobile optimized, or a dedicated mobile client application can be used. To make the service easy to use, there should be no need to change the web address or mobile client when examining the weather information for the Finnish or Russian side of the border. In addition to normal use as described above, it should be possible to subscribe to a service to receive alerts for sudden road / weather condition changes. Alerts could be delivered e.g. to a mobile phone using SMS.

Road weather information should be presented in a simple, clear format, but also more detailed information for professional or advanced use should be made available when needed.

2.3 Information & data sources

In both countries there are existing road weather stations, which will be used as the main source for raw data. It still needs to be verified that the number of weather stations is sufficient to achieve good coverage and quality for the whole corridor. In general, the principle is that data is gathered for professional use by the authorities but the same data can be reused to develop services for road users.

It's proposed that Finnish and Russian road authorities will collect the information from weather stations in Finland and Russia respectively and exchange the information with each other. This makes it possible for Russian and Finnish authorities to have real time road weather information for both Russian and Finnish sides of the corridor. Authorities in both countries can again expose weather information to third party service developers and providers so that they can productize new services for end users.

For weather information, at least the following measures need to be exchanged between Russian and Finnish authorities:

- Weather station address / location
- Time
- The air temperature
- The road surface temperature
- Precipitation conditions
- Information about road surface conditions and slipperiness
- Forecast for weather station points

Later, after initial proof of concept, it can be considered whether the service quality can be further increased using alternative data sources such as temperature measurements and slipperiness information from moving vehicles.

2.3.1 Data sources in Finland

Road weather information (current and forecast) is available from Digitraffic service owned by Finnish Transport Agency. Data is available free of charge but users / service developers need to register to get a user account. More information and interface descriptions can be found on Digitraffic web pages:
http://www.infotripla.fi/digitraffic/english/index.html. Digitraffic service is provided by Infortripla Oy jointly with other IT and ITS companies.

2.3.2 Data sources in Russia

It's proposed that Rosavtodor through St Petersburg Traffic Management Centre will aggregate road weather information from the Russian side and make it available over web interfaces. In practice this work can be done by a subcontractor on behalf of / for St Petersburg TMC. Such a contractor could be e.g. Optima Group which could assume the similar role as Infotripla Oy in Finland.

2.4 Next steps to be discussed / agreed between Finnish – Russian stakeholders:

- How information is exchanged between Russian and Finnish authorities (directly between authorities or between service providers), what is the interface to be used (e.g. based on DATEX2 which is promoted by European Union)
- Who is the service provider in charge of end user services (to whom authorities will open the interfaces for weather data)
- Business model, can the information be exposed and exchanged free of charge?

3. Pilot #2: Automated incident detection and alert system

This pilot consists of two different areas; eCall - ERA-GLONASS compatibility and incident information for road users.

3.1 Pilot #2A: eCall – ERA-GLONASS compatibility

A Pan-European eCall system and service will be implanted in EU Member States and to all new cars in Europe from 2015 onwards. The same development has been going on also in Russia. In both European eCall and Russian ERA-GLONASS systems emergency call is established automatically (or manually) in case of an accident and information about the location and other relevant data (Minimum Set of Data, MSD) is sent to the Public-Safety Answering Point (PSAP). At the same time a voice connection is established to the driver. Both actions are necessary in order to be able to deliver required emergency service to the accident site as fast as possible. The ERA-GLONASS service will be taken into use in new vehicles starting 2014 in Russia.

So far the focus has mostly been on defining and implementing the service on a national level. However, eCall has to serve the citizens all over Europe. Therefore, the interoperability and cross border functionality is of major importance and attention has to be paid on these functions and testing. eCall – ERA-GLONASS compatibility is an important topic also between Finland and Russia because of the increasing amount of travel and connections. Actions including interoperability testing has so far been quite limited between EU and Russia.

As eCall – ERA-GLONASS compatibility planning is in its early stages, further action should be started as soon as possible. Thus it is proposed that an architectural framework for eCall – ERA-GLONASS cooperation will be defined starting in the beginning of 2013 followed by an actual interoperability piloting period.

The architectural framework will define e.g. the following things among others:

- Required stakeholders
- ERA-GLONASS / eCall Vehicle – PSAP interface compatibility
- ERA-GLONASS / eCall call functionality in cross-border use
- PSAPs used (call routed to PSAP in current country or home country)
- Mobile Network Operators and implementation/operation of eCall flag and roaming issues
- Pilot and testing execution plan in live environment in the STC including selection of eCall/ERA-Glonass IVS devices
- Contribution to eCall standards via HeERO project and ERA-Glonass standards via Glonass Union
- Passing information about accidents automatically to Traffic Management Centres and related incident databases (still taking privacy issues into account)

3.1.1 Next steps, to be investigated:

- Clarify required stakeholders in Finland and Russia
- Verify funding for the framework planning phase in Finland and Russia

- Define FI-RUS organization for the cooperation
- Make a detailed project plan
- Jointly start the project implementation in the beginning of 2013

3.2 Pilot #2B: Incident information for road users

This section discusses the incident information system for road users. It should be noted that there is a clear linkage between eCall – ERA-GLONASS interoperability and the incident information system, for example through automated accident information delivery from PSAP to traffic management.

3.2.1 Current state & Information sources

The starting point for this pilot is the same as with weather services. There are incident (road work, accidents, etc.) information and services in both countries (maintained by authorities) but information between Russia and Finland is not exchanged and access to incident information is not straightforward.

As with weather services, it is proposed that authorities or service providers will exchange incident information with each other and then make combined Finnish – Russian incident information available to service developers and providers, which will make the information further available to road users.

3.2.2 Use cases

Road users will instantly and automatically receive information about incidents in the corridor area. Information about incidents can be delivered using the same channels as with weather services (Internet, mobile devices). Additionally, information about alternative routes can be provided, but in the first phase alternative route information will be limited to information on which border crossing stations should be used. For re-routing within a country. Existing services will be used (like connected personal navigators).

Radio is one important delivery channel and radio stations should take part in the pilot. For example there are two Russian language radio stations operating in Finland in the corridor area, Dorozhnoe radio http://dorognoe.ru/ and Radio Sputnik http://radiosputnik.fi/. These stations could broadcast incident and other traffic related information for Russian travellers residing in Finland. There are no Finnish language radio stations in Russia, but e.g. Radio Yle Kymenlaakso operating in South-East Finland close to the border could broadcast information about serious incidents in Russia. A prerequisite for a radio station to participate the pilot is that incident information will be easily available for them from both Finland and Russia e.g. using web interface. It is proposed that in the very first step of the priority pilot implementation such an interface will be developed and opened for radio stations.

3.2.3 Information sources in Finland

Information about accidents is available through various channels, either directly from authorities (Rescue services) http://www.pelastustoimi.fi/tehtavat/ or through commercial providers http://www.tilannehuone.fi/halytysmap.php. For the pilot, it is nevertheless proposed that the same Digitraffic service is used as for the weather information services (see 2.3.1). Information from Digitraffic combines both road work and accident information and accidents which have no impact on traffic have already been filtered out.

3.2.4 Information sources in Russia

In Russia accident information is handled by police and road work information by road authorities (Rosavtodor). There’s no combined data source and just like with weather information, it is proposed that St Petersburg Traffic Management Centre will take the aggregator role. See 2.3.2.

3.2.5 Next steps, to be investigated:

- Further clarify what incident information exists in Finland and Russia
- What is the presentation format of the incident information used today (type of incident, duration, location)
- How the location of the incident is presented, e.g. in Finland Digiroad http://www.digiroad.fi/en_GB/ is used, is there similar system in use in Russia?
- What are the options to deliver information about in-country alternative routes to road users
- Exchange information and experience of utilizing RDS-TMC (Radio Data System – Traffic Message Channel) system to deliver traffic delay information to the navigators of drivers on the road via FM radio waves in Finland and Russia

4. Pilot #3: Real-time traffic and travel time information service

4.1 Use case

Road user will get real-time information about the traffic situation, travel time, routes, border crossing, parking etc. using internet or mobile devices.

4.2 Current state

In Finland rajaliikenne.fi (www.rajaliikenne.fi) web portal is the central place for information for travellers between Finland and Russia in south-east Finland. The service is available in both Finnish and Russian languages and provides information on for example border stations, border crossing processes, queuing times at the border, road weather close to border, road cameras, incidents etc. Currently information is available only for the Finnish side. The service is provided by the Centre for Economic Development, Transport and the Environment of Southeast Finland.

In Russia Granitsa Online (http://granitsa-online.com/) is a commercial service provider providing information about border queuing times, web cam pictures etc. It includes web camera pictures also from the Finnish side and service is provided in Russian, Finnish and English. Radio Sputnik in Finland (see 3.2) is already co-operating with Granitsa Online by offering news about queue situation at border stations.

4.3 Proposal for further development

As rajaliikenne.fi already includes most of the information that is in the scope of this pilot, it is proposed that rajaliikenne.fi will be further developed so that

- The portal will include the same information for the Russian side as it does today for the Finnish side
- The geographical area will be expanded to cover the corridor from Helsinki to St Petersburg
- Traffic fluency information should be added (travel time service)
- The service will be made available also for mobile devices by optimizing the existing web pages for mobile use or by developing a dedicated client(s) for mobile devices
- Optionally an open (web-service) interface for service developers and providers could be created, so that they can easily combine services available through rajaliikenne.fi also with other services

To be able to have the same set of services for both Finnish and Russian sides of the border, the following information is needed from Russian authorities to complement existing services

- Queue length / waiting time at Russian side of border stations

- Road Weather Information (also part of a STC pilot #1)
- Incident information (also part of pilot STC pilot #2)
- Road camera view
- Information of border stations
- Information about border crossing processes
- Traffic fluency information

4.4 Next steps

- Investigate how to get missing pieces of information from Russia and whether St Petersburg TMC can also take the aggregator role for camera view and traffic fluency information (in addition to weather and incident information)
- Investigate where Granitsa Online obtains the queue time information and why there are differences in queue time information for the Finnish side between rajaliikenne.fi and Granitsa Online services.
- Investigate whether Russian provider(s) is/are also willing to develop traveller information service (e.g. Granitsa Online to develop service further)

5. Pilot #4: Public transport information service and schedule calculation

5.1 Data sources / current state

Today there are various tourist information and journey planner services available in both countries but quite often they are addressed for users in their own countries in their own language. Another problem is service discovery. As various service developers have developed regional journey planners, it is difficult especially for foreigners to find such planners in Internet.

In addition, journey planners cannot typically combine border crossing public transport with national / regional public transport. Therefore, travellers between Finland and Russian cannot fully utilize public transport when visiting the neighbouring country.

Currently data and information in electrical format is provided by public transport operators that operate between Russia - Finland and in related city areas. For example Helsinki Metropolitan Area's public transport operator offers open data access for mobile services. Data access for national railways is also possible. To utilize such data for STC pilots, all relevant data sources must be listed together with possible API information and the needed contracts for data delivery must be signed between the data provider and data aggregator.

The public transport operators' timetable and route data is more easily available for 3rd party services than the ticket and tariff data e.g. for trip cost comparisons and usually the ticket sales is carried out in the operator's own web-services. One-stop-shop ticketing could be considered as a part of the second phase pilots (enabling customers to buy all tickets for their journey from one place during a single session).

In both countries there are local journey planners and real-time information systems, which can be linked to general information services. A new international journey planner in full scope for the cross-border travellers might be too costly – and difficult to maintain – and is thus probably out of the scope of the STC project. Instead, the STC project could focus on certain selected routes for which a cross-border journey planner is applied.

Some links in Finland:

www.vr.fi (Finnish rail operator)
www.hsl.fi (Helsinki metropolitan operator)
www.finnair.fi (Finnish flights)

www.matkapojat.fi (Bus tours to St. Petersburg from Finland)
www.pohjolanmatka.fi/ (bus, rail, ship tours to St. Petersburg)
www.ferrycenter.fi (ships for St. Petersburg)
www.matka.fi (national journey planner)
www.matkahuolto.fi (national bus information operator)

5.2 Pilot service proposal and use cases

The key issue is to find service providers who will gather the relevant data and offer it via web and/or mobile services (see also section 6.2). Therefore, (commercial) service provider role will be introduced during this pilot. In addition to public transport information, the service should include the relevant POI (Point-of-Interest like hotels, shops, touristic attractions etc.) and touristic information (tolling, visas, cultural tips etc.) and good local maps. Public transport service information can be linked also to other services e.g. to information services aimed at private car drivers.

Travellers get information of different public transport alternatives and related services before and during his/her trip to the neighbouring country for the long-distance trip and for the connective trips (e.g. for urban travelling in Helsinki and St. Petersburg).

The services should be available in Russian / Finnish languages and like other services mentioned earlier in this document it should be possible to use the service both with mobile devices over mobile broadband and with a web-browser over Internet.
Services to be included in the (but not limited to):

- Route planning combining different means of transport for the most important routes like:
- St Petersburg – Helsinki / Helsinki Vantaa Airport (Allegro Train – Helsinki City bus network)
- Helsinki – St Petersburg / Most important tourist attractions (Allegro Train – St Petersburg Metro and bus networks)
- Metro and bus schedules and routes for St Petersburg and Helsinki (in Russian and Finnish) (development and further promotion of existing services like http://www.reittiopas.fi/ for Helsinki metropolitan area and http://transport.orgp.spb.ru for St Petersburg. Other cities in the corridor can be added later or during the commercial phase after pilots
- Links to other portals providing public transport information

The focus of this pilot could be on the Allegro speed train. There are two main approaches on Allegro users. 1) Make travel services available on the Allegro train 2) Provide information about connecting public transport lines for Allegro users.

5.2.1 Allegro on-train travel information over WLAN

The key enabler is to make a good quality on-train WLAN connection available for travellers on Allegro. By providing free or reasonably priced WLAN on-train internet access, the two largest barriers for service adoption would be tackled: 1) service discovery 2) cost of wireless data when abroad.

Service discovery: Having WLAN hot-spots on train, it would be possible to introduce a “smart corridor internet landing page” for wireless devices (laptop, tablet, smart phone), which again makes it much easier to find various route planners and other information sources for public transportation of destination cities.

Roaming data cost: On the other hand when using WLAN connection, travellers do not need to worry about expensive cellular network data roaming cost, which in turn will lower the barrier to start using various travel information services with wireless devices.

Current state: The main use for on-train WLAN today is the usage by authorities. For example, for passport control WLAN connection must be available. Public WLAN access on-train is currently tested so that access is available but the service is not advertised. The reasoning for the “silent pilot” is that the train operator wants to evaluate whether traveller usage of WLAN disturbs the authority usage or not. If the public use of WLAN will cause disturbances on authority use, smart corridor project could initiate a sub-project to determine how to prioritize authority use of traveller use. In addition, back-haul connectivity (ground-to-train) may need to be enhanced to ensure good end-user experience.

5.2.2 Allegro on-train travel information for connections

Information about further connections from destination train stations should be provided. Information should be location and context dependent. For example, travellers on Allegro can give their airport and flight number as an input and in return the service will provide information about the destination train station, how to reach the airport from the train station, flight terminal and flight gate. There have been preliminary discussions about this use case with Helsinki regional public transportation and Helsinki-Vantaa airport and basic enablers for such a service appear to be in place.

5.3 Next steps

The key enabler to this pilot advancing further is identifying service providers to offer travel information services in Finland and Russia. Another prerequisite is to identify which schedules / timetables are already available in Finland and Russia in machine readable format and what are the restrictions to combine such schedules with other services. For journey planners, it will be important to define which are the first priority border crossing routes where end to end route planning could be implemented in the first phase (e.g. allegro – harbours, air ports etc…).

Discussions have been initiated in Finland with the Allegro train operator about WLAN usage, the airport operator about the possibility to get access to terminal and gate information and so on. Allegro – Helsinki-Vantaa airport will be considered as the main connection for this pilot and further connections will be added later on.

6. Pilots common themes

6.1 Open Data

All services / pilots presume the use of existing information resources / opening of data sources both in Finland and Russia. It is proposed that during the pilot Finnish and Russian authorities will open the data and related interfaces only to the service provider(s) participating in the pilot and to their counterpart authorities in the neighbouring country (Finland / Russia). However, at the same time it should be evaluated how and under which conditions interfaces could be opened to any interested party so that plenty of new services utilizing the same data sources could be developed. In this evaluation issues such as data ownership, intellectual property rights, technical capabilities (preventing overload), and restrictions of the usage for commercial use and so on will be considered.

Interfaces should be open and in machine readable format. Data format, codec, protocols, etc. will further specified and agreed during the pilot preparations.

As discussed in 3.2.3, in Finland Digitraffic is a service offering real time and historical information and data about traffic on the Finnish main roads. The service is provided by the Finnish Transport Agency, and it is addressed for organizations developing information services or working with traffic management and planning.

The information service developers are provided with traffic data by web service interfaces. Professional users of Finnish Transport Agency and Centres for Economic Development, Transport and the Environment (Traffic sector) are provided with a net application that can be used for traffic monitoring and creating various reports concerning real time or past traffic on certain road stretches. More information about Digitraffic can be found here: http://www.infotripla.fi/digitraffic/english/

It should be evaluated whether similar service(s) could be made available in Russia and whether Digitraffic would be the way to make Finnish traffic information available for Russian authorities. As described in 2.3.2 St Petersburg Traffic Management Centre could take the key role here.

In general, for each of the services in this document, the following topics need to be clarified:
Authority Databases

- Data contents (tables)
- Representation definition (format, length etc.)
- Interface definition (outbound)
- Availability (Open data/available/only for authority use)
- IPR's

Information sources for Authority Databases

- Data creation (by "owner"/maintaining authority)
- Data retrieval (from other authorities data bases/sources)
- Data collection (information requirements for other organizations, business etc.)
- Other sources
    - Bases for collection/retrieval/creation (why/mandate: law, act, regulation etc.)
    - from whom
    - how (method)
    - format
    - inbound interface(s)

6.2 The role of the service provider

Although the long-term goal is to ensure that there will be many service providers in both countries which may focus even on selected subset of services (e.g. weather services only), it is still proposed that during the pilots, all services are deployed in a multimodal approach i.e. in a way that the same service provider will provide all services in the pilot scope to end customers. This would be the most cost efficient approach and it would also simplify the technical architecture used during the pilots.

During the pilot the service provider will be responsible for (but not limited to)

- End user contacts and acquisition of pilot users
- Web and mobile device user interface development and provisioning towards the end users. For illustrative example of potential und user interface, please refer to http://vedia.fi/beta/
- Building of the business model (free and chargeable services, advertising, etc.)
- Relationship with mobile operators (for example, to find a solution to keep data roaming charged under control).
- Potentially exchange information between service providers (Russian – Finland)

During the pilot period the focus will be on defining roles and the interfaces of the service providers.

The picture below shows an illustrative example of potential pilot implementation.

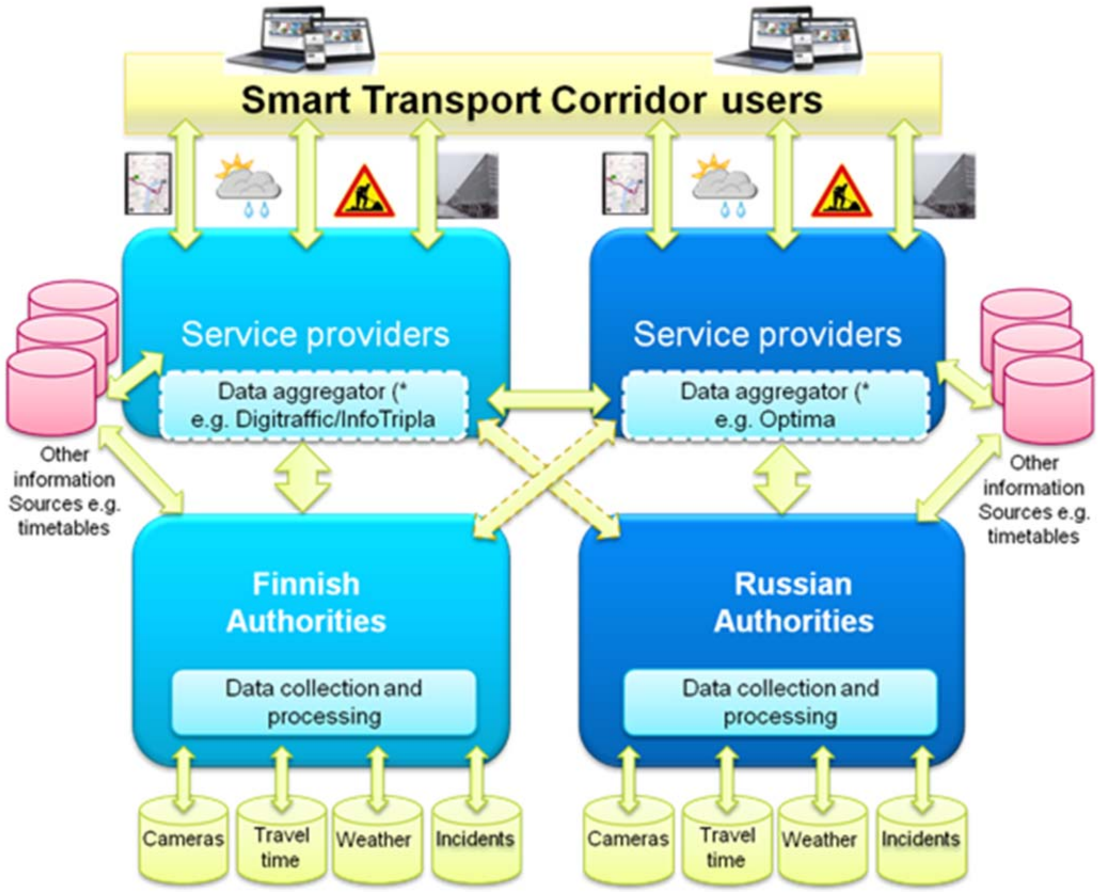

Figure 1. Overall pilot implementation framework

6.3 Pilot steps

To implement the pilots in the most cost effective manner it is proposed that instead of running four pilots in parallel, pilots will be implemented in three steps so that new functionality will be implemented on top of the previous step. However, preparations for the next step of the pilot can and should be started while running the previous step of the pilot. As the nature of eCall – ERA-GLONASS is different from other pilots; it should be handled separately and executed in parallel to other pilots.

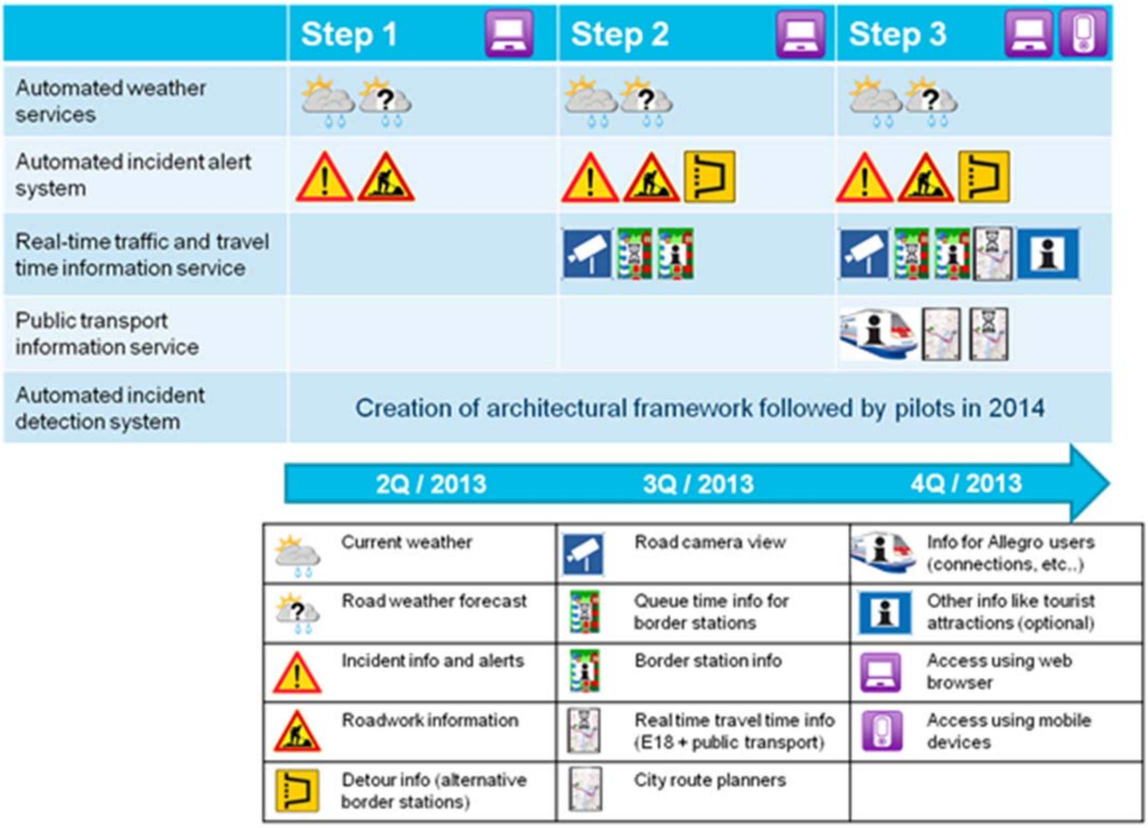

Figure 2. Priority pilot steps

6.3.1 Step 1 – Weather and incident information

The goal of this step is to prove that

- Required data can be collected in both countries
- Data can be exchanged between the countries
- New applications can be developed on top of the exposed data

Required data is weather and incident data.

In this step, no road users / travellers will be directly involved. Instead, simple web based applications are developed to prove that it is possible to show weather and incident information for the whole corridor. Web access can also be made available to radio stations.

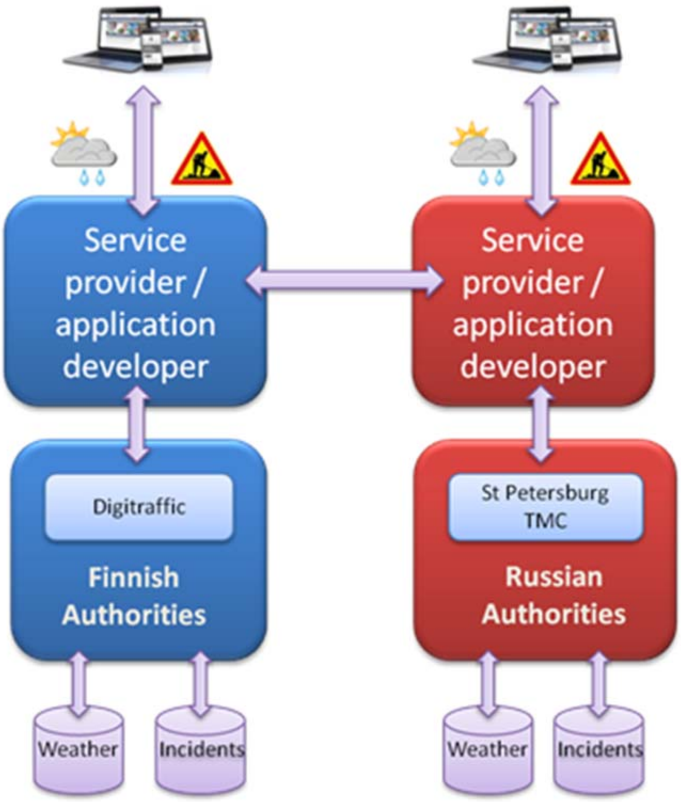

Figure 3. Pilot step 1 architecture (illustrative only)

6.3.2 Step 2 – Real-time traffic and travel time information service

The goal of this step is to add more information sources and make the web service available to road users. As discussed in section 4, it is proposed that rajaliikenne.fi is expanded to cover the whole corridor. In addition, in case any Russian stakeholder is interested in developing a similar service in Russia, Russian service provider, e.g. Granitsa Online can also be added.

Service delivery is implemented over Internet using web browsers, although mobile optimized web pages or mobile clients would make service more appealing for mobile users.

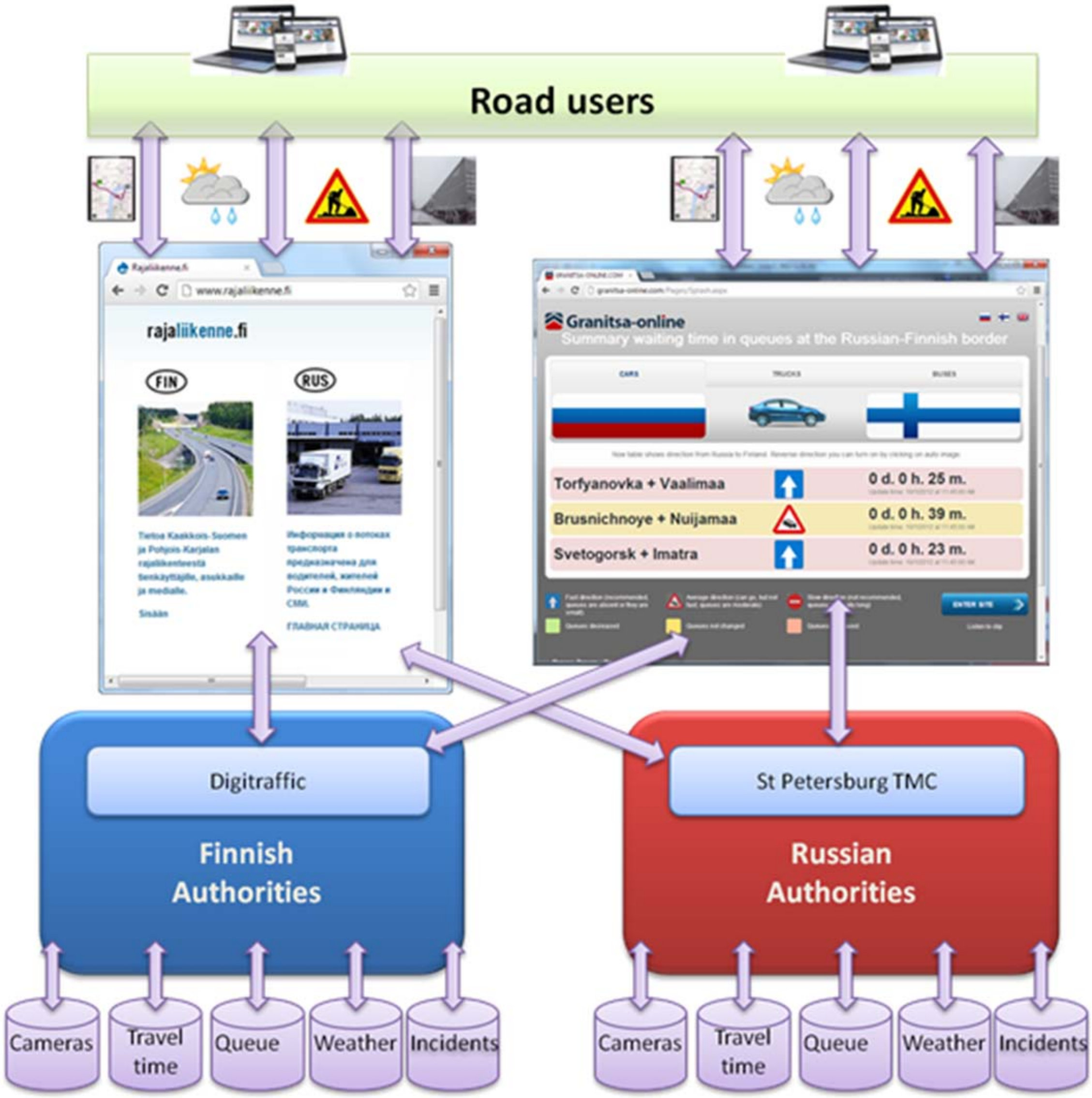

Figure 4. Pilot step 2 architecture (illustrative only)

6.3.3 Step 3 – Public transport information service and schedule calculation

In this step commercial service provider(s) come in to the picture and new commercial information sources are added. The most important new services will be public transport information service and related journey planners for schedule calculation. The goal is to enable the creation of new commercial services by utilizing data from authorities and other public sources and to show that it is possible develop a sustainable business model for ITS services based on open data.

The pilot services are deployed in a multimodal approach i.e. in a way that the same service provider will provide all services in the pilot scope to end users. In Finland the service provider candidate is Itella Oyj who targets to increase the multimodality of its information logistics services scoping across Finnish-Russian border and is piloting new ways to communicate and advertise.

In general, Itella Oyj is a service business whose core competence lies in information and product flow management for its key customers:

- In Finland, Itella's key mission is to provide daily mail services nationwide.

- For corporate customers Itella provides solutions that enable them to enhance their competitiveness and run their business more successfully.

The business model part of the step 3 pilot project targets to:

- Test the feasibility of the total service offering for management of smart corridor traffic and the related commercial services within the architecture defined by STC-project.
- Describing the components of the total service offering such as terminal equipment, telecommunication, server solutions, business process and the most important technology choices
- Defining preliminary estimate of the costs for developing the total service offering, implementation and maintenance for limited proof-of-concept – e.g. 3,4 million border crossing people in production scope
- Supporting the STC-project verification

Expected results of the piloted service:

- Verify the business model with concrete customer cases
- Get user feedback of the piloted services for further improvements
- Build the business ecosystem for service pilot and production needs

Although Itella could also provide services for Russian users, the aspiration is to have a Russian service provider operating in Russia providing services for Russian users. As discussed in 2.3.2, Optima Group could assume the role to aggregate weather information in Russia. This role could be further expanded to also aggregate other data from various sources Russia and ultimately to provide services for end users either directly or with service distributors.

There needs to be a sufficient user base for the pilot to achieve reliable results. As key services to be piloted during this step are services around public transport, Allegro users are obviously key targets for this step.

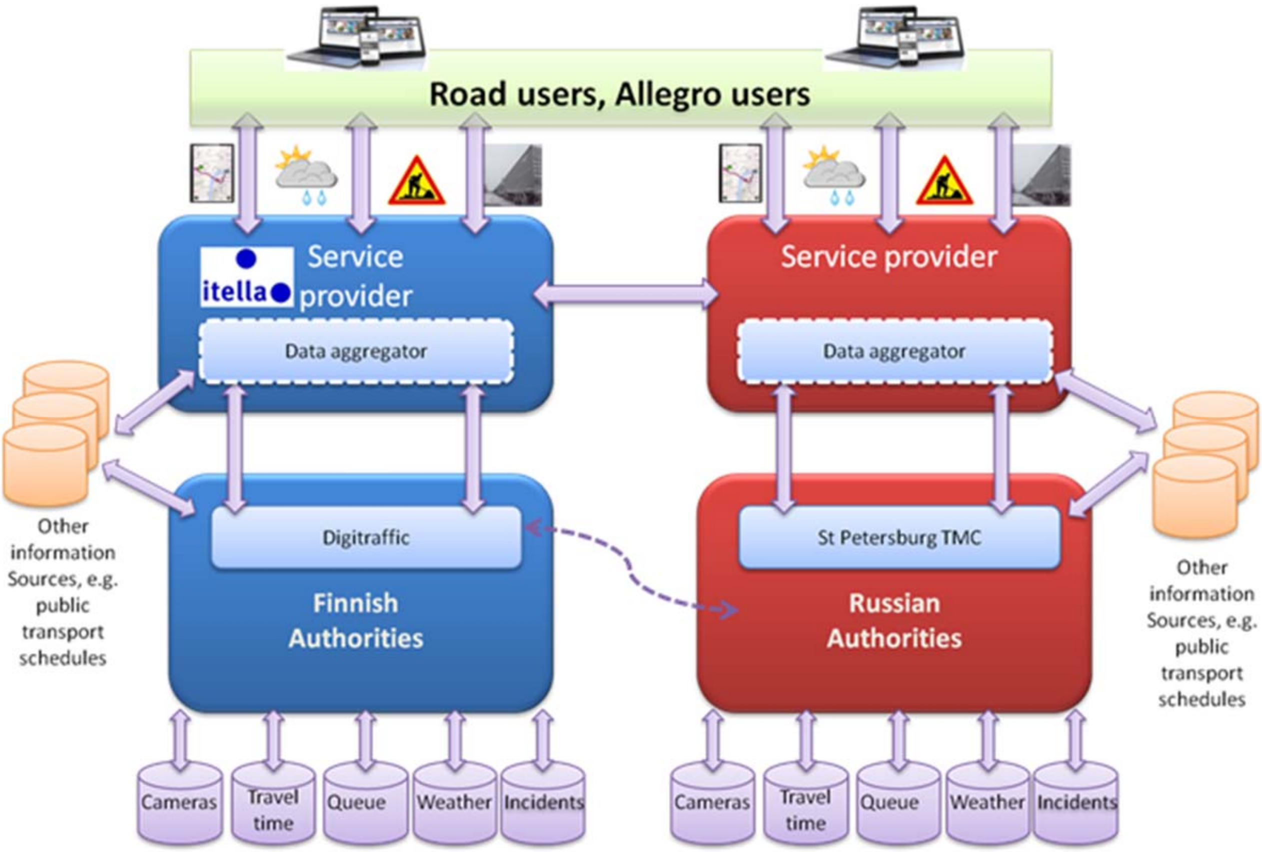

Figure 5. Pilot step 3 architecture (illustrative only)

Note that in the picture describing the pilot step 3 architecture, “Data aggregator” role may be embedded in the Service provider role, but it may well be implemented also as a separate function.

6.4 The role of mobile operators

As it is expected that the most common way to use road user services is to use mobile devices utilizing mobile broadband, mobile operators are in an important position to ensure that the services will gain popularity among travellers.

Currently, data roaming charges between Finland and Russia are quite high and there are large differences in tariff plans between mobile operators. For example, when Finnish mobile data user uses mobile data in Russia, depending on the operator, the cost might vary from 0.84 €/MB up to 12 €/MB. For Russian users visiting Finland the cost varies from ~1.2 €/MB up to ~18 €/MB. (For reference, with mobile version of Google maps search “Helsinki, Finland” with traffic information on, resulting map view of Helsinki city centre with real time traffic information, used ~1 MB of mobile data.)

If the cost of using data roaming is high and forecasting of the cost is difficult, it is highly possible that travellers will not use services that are based on mobile data. Therefore, during pilot planning it needs to be considered how reasonably priced, predictable mobile data for travel information use can be provided. In addition to co-operation with mobile operators also other options can be considered (e.g. prepaid SIM cards partially sponsored by local businesses etc.).

Liikenne- ja viestintäministeriö

Summary of findings from “Interfaces, Standards and Code Lists in Data Communication between Authorities” study

Contents

1. Intoduction

This study has been made in order to encourage authorities in Finland and Russia to utilise and implement international standards, recommendations and codes in information systems in their respective countries.

The use of harmonized data contents and common terminology, in particular when exchanging data between authority information systems, will result smooth transport flow and less delays in border crossing due to more effective data communication with less errors, ambiguities and confusion.

The purpose of this document is also to provide information and ideas how data exchange among authorities and between authorities and business could be made more effective and harmonized. The content is focused especially for the Smart Transport Corridor (STC) services. The same tools can naturally be used in the data exchange and utilization between authorities and business where applicable. The fundament of approach in this study is the utilisation of standards, recommendations and code lists for exchange and representation of data for different purposes.

The standards and recommendations introduced in this document can be categorised in several different ways, hence, it should be borne in mind that there are different standards for different purposes and in Smart Transport Corridor environment a distinction should be made between standards for traffic management purposes and business oriented standards and recommendations. Business oriented standards and recommendations are used e.g. in border crossing activities, like customs clearance, transport documents as well as in general data exchange between traders and administration.

Another idea is, that whenever possible, the required data is collected only once and then reused among relevant authorities where needed. This means that there could be an agreement between the authorities to collect the information from various sources and then distribute it to other authorized agencies. The reusability will reduce the administrative burden for companies and agencies as well as improve the quality of data. The tools introduced in this document are not only used in Smart Transport Corridor but the approach is also globally utilised in implementing the Single Window system.

The full document introduces a selection of the centric ITS data communication and other closely related standards developing organizations and their deliverables. However, this study is neither aiming to be a comprehensive reference to standards organizations nor ITS related standards and recommendations.

2. Interfaces, Standards and Code lists in Data Communication between Authorities

In order to operate smoothly, cross-border transport services require several different data sources like traffic authorities, weather services and private sector service provider's information, to be easily accessible by other relevant authorities and service providers. The access to relevant data should be as easy from both sides of the border as it is on national bases. This is important in order to effectively utilize available information and to develop innovative new services.

Among the existing Smart Transport Corridor services there is low level of general agreement on the standards and format(s) of exchanged information, as well as on interfaces to other services.
At the moment, most STC related services (even those provided by public authorities) tend to be stand-alone and operating in isolation from other services. This is slowing

down the development and utilization of service portfolio among the users of the Smart Transport Corridor (eg. passenger traffic and goods transport).

The first prerequisite for interoperable services is to define and agree upon interfaces for data retrieval as well as standards and codes used for information representation and exchange. This definition and agreement is also for major importance in order to establish a solid platform for further development of Smart Transport Corridor services and innovations for creation of new services. Otherwise the burden to identify the relevant authorities, negotiate the data release contracts and create the application programming interfaces individually for each service becomes a supreme barrier.

The availability of STC services on equal level, across and in both sides of the border, is of major importance for the good overall user experience. The seamless interoperability is an important element in attracting the passengers and professional hauliers to utilise these services and encourage for further development of Smart Transport Corridor commercial and public services.

On the way to smooth Smart Transport Corridor services development and interoperability, an important proposal to define an international standard under the auspices of ISO TC204 for the use of “ITS for Transport Corridor Management” has been introduced and proposed by ITS Russia in autumn 2012.

2.1 Standards, Recommendations and Code lists

There are quite a number of international, regional and national organizations developing standards for data communication and even for transport specific data exchange. The deliverables of these specialized standardisation bodies are in favor of development of interoperability, common interfaces and harmonised approach. Also many standards and recommendations for general data exchange are very well suitable for transport as well as Smart Transport Corridor services.

It should be clear in mind that there are different standards for different purposes and in Smart Transport Corridor environment and a distinction should be made between traffic management oriented standards and business oriented standards and recommendations. Also several standards and recommendations can be utilised for multimodal transport purposes but some are especially aimed for certain mode(s) of transport. Most of the transport modes use basically similar processes and documents, but often “tuned” to fulfill different requirements and needs of the specific mode. In electronic data exchange the defined data elements and code lists normally cover the needs of different modes.

In the following some of the organizations developing standards, recommendations and code lists as well as their products, deemed most suitable for STC- purposes, are briefly referred and introduced.

2.1.1 Standardisation organisations

2.1.1.1 ISO TC204

The work of ISO/TC 204 encompasses standardization of information, communication and control systems in the field of urban and rural surface transportation, including intermodal and multimodal aspects, traveler information, traffic management, public transport, commercial transport, emergency services and commercial services, generally referred to as “Intelligent Transport Systems (ITS).”

ISO/TC204 has several working groups that are developing ITS standards[1]. Most relevant for the work of STC data exchange are: WG3, WG4, WG7, WG9, WG16 and WG18.

2.1.1.2 CEN TC278

CEN has a long history of standardization in the field of Intelligent Transport Systems, through CEN/TC 278. The standardization work of CEN/TC 278 is restricted to application of telematics for Road Transport and Traffic only. It is defined as a group of services utilizing information technology and telecommunications, in vehicles and infrastructure, to improve (mainly) road transportation from the points of view of safety, efficiency, comfort and environment. The practical standardization work of CEN TC278 is undertaken in several working groups. One of the major achievements by CEN TC278 in the area of ITS is DATEX II standard, which is introduced in chapter 2.1.2.2.

2.1.1.3 UN/ECE – Inland Transport Committee (ITC) – Intelligent Transport System

The UNECE Working Parties dealing with Intelligent Transport Systems are the Working Party on Road Traffic Safety (WP.1), for example, is advancing on liability concerns, Variable Message Signs or safety risks related to driver distraction. The Working Party on the Transport of Dangerous Goods (WP.15) examines how telematics can be used to enhance safety and security and the Working Party on Road Transport (SC.1) drives e.g. the e-CMR implementation. The World Forum for Harmonization of Vehicle Regulations (WP.29) promotes ITS-matters on-board of vehicles. Two specific areas under UN/ECE - ITC related to STC project are Border Crossing Facilitation (e.g. TIR and eTIR) and Transport of Dangerous Goods.

2.1.1.4 UN/ECE – CEFACT Centre for Trade Facilitation and Electronic Business

The United Nations Economic Commission for Europe (UN/ECE) serves as the focal point for trade facilitation recommendations and electronic business standards, covering both commercial and government business processes that can foster growth in international trade and related services. In this context, the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) was established, as a subsidiary, intergovernmental body, mandated to develop a programme of work of global relevance to achieve improved worldwide coordination and cooperation in these areas.[2]

UN/CEFACT supports activities dedicated to improving the ability of business by securing coherence in the development of Standards and recommendations by co-operating with other international intergovernmental and non-governmental organizations. This coherence is facilitated by cooperating with e.g. the International Organization for Standardization (ISO). These relationships have been established and maintained in recognition of the broad application that UN/CEFACT work has in areas beyond global commerce and the key objectives of interoperability between applications and the ability to support multilingual environments.

- Trade Facilitation Recommendations
- Electronic Business Standards
- Technical Specifications

2.1.1.5 Finnish standardisation organisations for ITS

The Finnish national standardisation organization SFS is the official body representing Finland and participating the international standardisation work within ISO and CEN in Europe. SFS has delegated the work under ISO TC204 to be conducted by General Industry Federation (Yleinen Teollisuusliitto). Finland has an observer status in ISO TC204. There is also some private sector participation to ITS and data communication sector standardization work. In Finland the standards by ISO and CEN are mainly

[1] http://www.iso.org/iso/iso_technical_committee?commid=54706
[2] http://www.unece.org/cefact.html

endorsed as national standards and also the technical specifications by international standardisation organizations are generally acknowledged.

2.1.1.6 Russian standardisation organisations for ITS

The Russian state standard authority is ROSSTANDARD or GOST-R[3]. There are about 480 technical committees in Russia e.g GOST-R TC355 “Automatic identification” and GOST-R TC22 “Information Technology” to name some. The full list of TC’s on standardisation can be found at http://tk.gost.ru/wps/portal/ .

2.1.2 Standards

There are different needs for data exchange standards for different purposes in the area of ITS and they can be classified and categorised in different ways. For this project we can identify two main categories according to their use.

The first category is standards for information exchange between traffic management centres, traffic information centres and service providers (like DATEX II). The other category is data exchange standards for commercial and administrative use which are suitable for more general purposes (like data presentation standards and message standards) also.

2.1.2.1 ISO Standards

As already mentioned (in chapter 2.1.1.1) the body mainly responsible for international ITS related standards within ISO is TC204. The working groups developing standards within ISO TC204 was also referred in same chapter. In addition to different aspects of Intelligent Transport System, ISO TC204 standards deal with:

- Transport information and control systems,
- Road transport and traffic telematics
- Traffic and Traveller Information
- Automatic vehicle and equipment identification and,
- Electronic fee collection

The list of published ISO ITS standards is available on the ISO TC204 website [4]
Particularly related to ITS Corridor Management, the ISO TC204 meeting in Moscow (Oct, 2012) recognized the increasing need to start the standardization activities concerning this issue, including technology testing and validation. Hence, ISO TC204 resolved to establish a study group on standardization requirements for ITS corridor management and also invite CEN TC278 to join the initiative. The study group will be led by representative of the Russian Federation.

2.1.2.2 CEN DATEX II

DATEX standard was developed by CEN Technical Committee 278 for information exchange between traffic management centres, traffic information operators, service providers and media partners. DATEX is a specification that is meant to operate at and represent the interface between the worlds of dynamic traffic and IT.
The second generation, DATEX II specification, is aimed also for actors in the traffic and travel information sector. With the new generation DATEX II it has become the reference for all applications requiring access to dynamic traffic and travel related information in Europe. The coordination and harmonisation of traffic management measures between road operators is an essential part of maximizing the capacities of their road networks to reduce the effects of congestion and improving safety.

[3] http://gost.ru
[4] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_tc_browse.htm?commid=54706&published=on

DATEX II is a multi-part Standard. The first three Parts of the CEN DATEX II series (CEN 16157) have already been approved as Technical Specifications. The flexible approach and the built-in extensibility make it likely that coverage will extend even further in the future and that DATEX II will become the leading reference model for information exchange in road transport all over Europe.

2.1.3 Recommendations

UN/CEFACT has developed and published and endorsed through UN/ECE several international recommendations for trade facilitation purposes to be utilized in international trade transactions. The recommendations are aimed for both business and administration. Many of the recommendations are related to exchange of data between business and administration.

The leading idea of trade facilitation recommendations is simplification of business processes, procedures and utilization as well as reuse of data. Many trade facilitation recommendations can be used in ITS area as well, maybe not directly but as an element of standardised or internationally agreed procedure, practice or information representation syntax. Some of the Trade Facilitation Recommendations are aimed for transport related documents and data exchange, like Recommendation 11 -"Facilitation of Transport Documents and Procedures "Documentary Aspects of the Transport of Dangerous Goods".

2.1.4 Code lists

Even the utilization of standardised code lists could provide remarkable effectiveness and uniformity for services. Furthermore the implementation of standard code lists does not necessarily require the simultaneous renewal of documents or their data contents.

The main benefits from the use of standardized code lists are results from reduced number of errors and need for interpretation of data, as well as from increased speed, timeliness and reusability of information. The recommendations which are also international standards (most suitable for ITS) related to data representation and exchange are[5]:

Rec 3.	Code for the Representation of Names of Countries, ISO 3166-1-alpha-2 code elements
Rec 7.	Numerical Representation of Dates, Time and Periods of Time ISO 8601
Rec 9.	Alphabetic Code for the Representation of Currencies, ISO 4217
Rec 25.	UN Electronic Data Interchange for Administration, Commerce (UN/EDIFACT), ISO 7273

2.2 Open data

In order to facilitate development of new cross-border transport services, authorities on both sides of the border are encouraged to open their relevant databases for general use without legal or technical limitations whenever possible. Both, the data release licenses as well as the application programming interfaces should allow free utilization and reuse of the data.

It has been found that public authorities' own knowledge management intensifies when they become aware and get easy access to each others' data repositories. Also utilization of data, already collected once by other authorities and not to make individual data requests to companies, makes the data retrieval more effective for authorities, as well as reduces the administrative burden for business.

[5] http://www.unece.org/cefact/recommendations/rec_index.html

International studies have shown that open access to public authorities' data repositories fosters innovation and growth of particularly small and medium sized companies that can utilize this data in their service development and production. This would create new business opportunities for SME's developing products and services for companies alongside the corridor as well as for the users of the corridor.

2.2.1 Some Open data license issues

To be useful for third parties and in order to avoid confusion in Open data re-use based service development, data made available by authorities and other stakeholders must be published under a clear rights statement. There are various statements and licenses that can be used to publish data, ranging from restrictive to fully open.

2.2.2 Utilization of Open data within STC

In the case of Smart Transport Corridor between Helsinki-St. Petersburg, data repositories and different databases have to be identified on both sides of the border.

- What relevant data exists?
- Who maintains it?
- What kinds of data formats and access interface standards are used?
- Which access licenses are used?

When information is correlated with a survey of Finnish and Russian traffic service developers' needs, we can deduce which data repositories should be opened first for general use.

Information on the available data repositories is to be collected on a cross-border Smart Transport Corridor data catalogue depicting the data with corresponding access licenses and technological definitions. This data catalogue provides an easy access point for companies and authorities looking for data resources they need.

2.3 Single Window approach

The development of Smart Transport Corridor services as well as structured data exchange between authorities enable a good starting point for development of Single Window service. One of the key ideas of Single Window concept is the reusability of the collected information. Hence, in order to fully benefit of this feature the data requirements by different authorities should be simplified, standardized and harmonized.
The Single Window solution seems to be most beneficial in providing information for authorities in the importing country and also in advancing the automated and electronic processes in the border crossing.

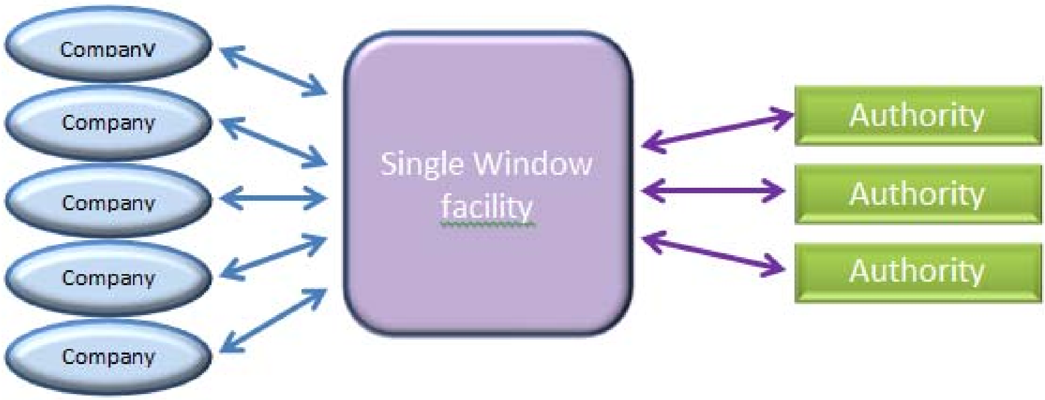

Figure 1. A simplified model of Single Window principle

The basic idea of Single Window system is that required data in the form of harmonised list of mandatory elements is collected only once and then distributed and reused among relevant authorities where needed and possible to implement. This will reduce the administrative burden companies and agencies as well as improve the quality of data.

The Single Window operational development consists of several steps. The main steps are establishing the facility, simplifying and harmonising the collected data, checking the legal framework and creating interoperability with other Single Window systems. These steps are described in UN/CEFACT Trade Facilitation Recommendations 33 to 36.[6] (Recommendation 36 - Single Window Interoperability is under development)

3. Experimental Section - Smart Transport Corridor Pilot case studies

3.1 Common issues for pilots

All services/pilots presume the use of existing information resources and opening of data sources both in Finland and Russia. It's proposed that during the pilot Finnish and Russian authorities will open the data and related interfaces only to the service provider(s) participating the pilot and to the counterpart authorities in neighboring country (Finland / Russia).

In evaluation of openness things like data ownership, intellectual property rights, technical capabilities (preventing overload), and restrictions of the usage for commercial use and so on will be considered.
Interfaces should be open and in machine readable format. Data format, codes, protocols, etc. will be further specified and agreed during the pilot preparations.

3.2 Information sources

3.2.1 Digitraffic

Digitraffic is a service offering real time and historical information and data about the traffic on the Finnish main roads. The service is provided by the Finnish Transport Agency, and it is addressed for organisations developing information services or working with traffic management and planning.

The information service developers are provided with traffic data through web service interface, in DATEX II -format. Digitraffic service is collecting information from several

6 http://www.unece.org/cefact/recommendations/rec_index.html

different sources like: Travel Time System and the automatic measuring devices (LAM) of the Finnish Transport Agency, road weather stations, road surface pictures.

More detailed information on Digitraffic service as well as information for utilisers can be found in http://www.infotripla.fi/digitraffic/english/presentation.html

3.2.2 Rajaliikenne.fi

Another service providing information on E18 corridor is Rajaliikenne.fi[7]. Rajaliikenne.fi contains information especially on important border crossing issues and traffic situation, like queue lengths, waiting times on border crossing stations, border crossing arrangements and procedures as well as presentation of all the South-Eastern border crossing stations in the Finnish side of the border.

3.2.3 Interfaces for Public Transport Journey Planner in Helsinki Region

Helsinki Regional Transport Authority (HSL) offers access directly to Reittiopas (Journey Planner) interface, when application or service supports public transport usage and transport information availability[8]. There are two possible way to access timetable and route data.

Poikkeusinfo XML API is interface to exceptional traffic situation information service for Public transport. Information is provided on all modes of public transport (tram, ferry, train, metro and bus traffic). The service is provided in Finnish, Swedish and English languages.

Omat Lähdöt is a public information service that combines the schedule information with real –time data, information on exceptional traffic and disturbances under a single user interface. This service can be personalized, upon the passenger’s own selection, for the stops and routes that the passenger is regularly using.

3.3 Data definition for harmonization purposes

The issue of data harmonization does too often considered as technical and operational topic and ithe importance is not communicated early enough in policy makers and system planners who make the decision. Also communication between different stakeholders (authorities/agencies, authorities and business) is not adequate either.

As well as a catalogue of open data interfaces and services is practical for development new services, the collection of structured “Metadata” catalogue of all collected data would be recommendable and practical in studying what data is already collected from business and other relevant parties by some authority or agency and also what kind of information is available in their existing data bases.

This information could be used in defining and developing new information services and collecting data without increasing the administrative burden to business or other authorities to provide the requested information.

4. Conclusions and proposals

- The use of harmonized data contents and common terminology, in particular when exchanging data between authority information systems, will result smooth traffic flow and less delays in border crossing due to more effective data communication with less errors, ambiguities and confusion.

[7] http://www.rajaliikenne.fi

[8] http://developer.reittiopas.fi/pages/en/home.php

- There are different standards for different purposes and in Smart Transport Corridor environment, a distinction should be made between traffic management oriented standards and business oriented standards and recommendations.

- To enable effective use of data among necessary authorities and agencies it is important to define the list of mandatory information requirements and implementation of the standards, recommendations and code lists in a harmonized manner.

- When possible, data should be collected only once in harmonized format and then reused among relevant authorities where needed. The reusability will reduce the administrative burden for companies and agencies as well as improve the quality of data.

- Authorities are encouraged to make agreements between the each other in order to delegate the collection of information from various sources and then where possible, share and distribute to other authorised agencies.

- Many Smart Transport Corridor services are, at least to the certain extent, based on standardised technologies, like RFID. However, the technologies and standards utilized are not always used in identical manner as there are different ways to implement and interpret the standards. Hence, a survey of interpretation of used technologies and standards should be done in order to create and guarantee the interconnectivity between Smart Transport Corridor services.

- Also a proposal to define an international standard under the auspices of ISO TC204 for the use of “ITS for Transport Corridor Management” has been introduced and proposed by ITS Russia. The parties in STC project should participate in this standardization effort bringing the experiences gained from STC project for benefit of global audience and implementation.

- Information on the available data repositories is to be collected on a cross-border Smart Transport Corridor data catalogue depicting the data with corresponding access licenses and technological definitions. This data catalogue provides an easy access point for companies and authorities looking for data resources they need.

Liikenne- ja viestintäministeriö

ANNEX 3

Summary of findings from “Traffic flows between Finland and the Russian Federation in 2020 and 2030. Forecast of economic development and transport of people and goods” study.

Methodology

The project had three different methodological sections: Analyses of economic development, and studies of freight and passenger transport. Economic analyses were done using a macroeconomic simulation model of ETLA, which was used to analyse a baseline scenario and alternative scenarios of economic development in the Russian Federation. The results were utilised to construct the level of export and import of goods for 2020 and 2030. These flows were further analysed by the Frisbee-model through presentation of the flows on a transport network according to cost optimization principles.

Uncertainties in the methodology involve the 20-year forecasting period; however, the trend in economic growth is in line with official Russian Federation growth estimates. Over the period of analyses the investments into transport infrastructure can also change, which may result in different outcomes in the future, if compared to those presented in the scenarios in this research project.

For passenger transport the cross-border traffic was analysed using a model of interaction, where two types of travelling zones were identified. Short distance travel for frequent cross-border cooperation includes the regions in the immediate proximity of the border, whereas the longer distance travel zones are for business commuting and leisure travel on more infrequent terms. Potential demand for travel was estimated for 2020 and 2030 using average volumes of trips, which were obtained from reference case studies. The levels of passengers also correspond to recent study by Finnish Ministry of Interior.

Results of the study were validated through workshops hosted by Finnish Transport Agency. Figures for freight transport and macroeconomic development were also reviewed by NIPI-RTI, a consultancy company based in Saint Petersburg. Their estimate was that the figures obtained from the study are in great detail in line with Russian official figures and estimates. Regarding classification of goods some discrepancies existed, which were considered an area of potential future cooperation.

Main results, freight transport

Freight transport analyses covered both exports and imports of the Russian Federation. With regards to Finland, the foreign trade transport consisted only of trade between Finland and Russian Federation, including the transit of goods through Finland. The transport network of Finland was kept as it is present also in the 2020 and 2030 estimations.

Russian Federations foreign trade is expected to grow at a steady rate, as well as the goods transported. Exports of Russian Federation are expected to grow by 35 per cent until 2020 and by 91 per cent by 2030. Imports are considered to grow 49 per cent and 126 per cent, respectively. Exports to outside European Union territories are expected to grow more than exports to the European Union.

In road transport the border crossings at Vaalimaa, Nuijamaa and Imatra pass considerably more freight to Russian Federation than the other way. The situation is opposite at the border crossings at Niirala and Vartius. Greatest pressures appear to face the Vaalimaa and Nuijamaa crossings in the future. Improvement of Imatra facilities can take some of the pressure off from these crossings. According to the forecasts the volume of freight transport increases by 30 per cent by 2020 and by 50 per cent by 2030.

Volumes of heavy goods transport increase on the daily average by 200 vehicles by 2020 in the section of E18 next to the border. By 2030 the volumes increase by total of 300 vehicles per day. On other segments of the road increases are less than this. Volumes are shown in the Figure below.

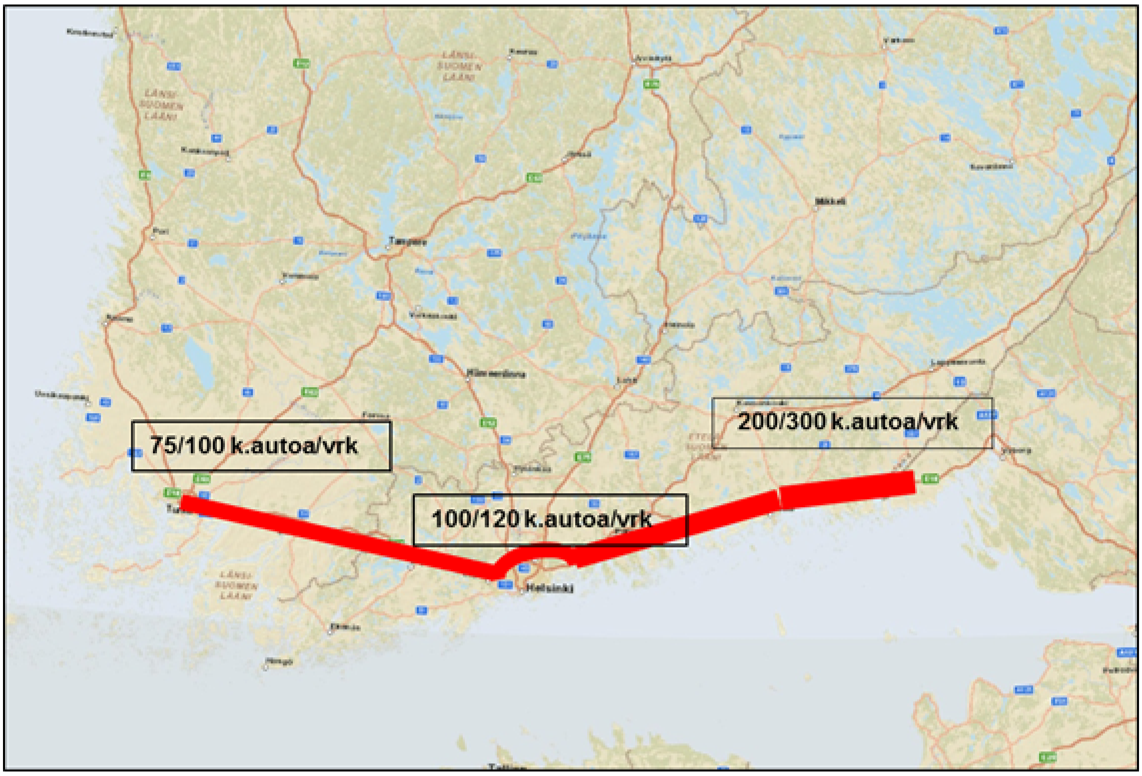

Figure. Increase in Russian Federation exports and imports road transport, number of heavy goods vehicles per day in 2020/2030.

Rail transport increases less than road transport. The major increase will take place in HaminaKotka port, where the potential volume of goods transported increases by 2.5 times compared to current situation by 2030. The increase in volume is directly proportional to increase in volume of shipped cargo. These transported volumes would correspond to 30-25 per cent of total transport of good by rail in Finland.

In maritime transport the volume of Russian Federation foreign trade shipments in 2011 was 183 million tonnes, out of which Baltic Sea ports excluding Kaliningrad were 170 million tonnes. Liquid bulk accounted for 100 million tonnes. According to the estimates the total volume in 2020 will be 210 million tonnes and by 2030 300 million tonnes, an increase of 70 per cent compared to 2011.

Despite the growth in Russian Federation ports the Finnis ports will also continue to increase the volume of goods transited as they will compensate for the increase in total volume of exports and imports. Growth in volume of freight has challenges, for instance the ice conditions will be faced by more ships and especially in the Russian Federation ports if the current climate trend continues.

Growth in passenger transport is expected to continue. The analyses carried out based on the interaction model indicate a two-fold increase compared to present situation by 2030. The main increase is expected to come from increase in movement between the larger cities across the border. The number of people living near the border on both sides is small and does not make it possible to increase volume significantly.

Most of the growth is expected to take place in South-Eastern border section of Finnish border with Russian Federation. The annual projected volume in 2015 exceeds 15 million border crossings, which is equal to the capacity constraint of the border crossings after planned investments. This indicates need for further investments. Russian residents are expected to dominate the border crossings in the future as well, the only notable exception being rail passengers where Finnish passengers have been the major passenger group.

Conclusions

Needs to develop the infrastructure and human resources

The main conclusion on passenger transport is that the border crossings volume means that capacity limit will be reached at 2015 or close to the date, unless more investment and resources are allocated to address the growing volume of passengers .Growth in freight transport is another challenge, the increases of 200 vehicles by 2020 and of 300 vehicles by 2030 require supporting infrastructure to guarantee safe and smooth border crossings for all types of transport.

Forecasted demand for rail transport means that daily number of trains between Helsinki and Russian cities (Saint Petersburg and Moscow) should also double, or increase even further. This is not possible with current use of rail and even with such investments the bottleneck would exist at Helsinki railway station.

Major challenge, however, remains with volume of private vehicles. The 2.5 increase in volume of passengers means that additional investments will be required. When estimated from present levels, this would mean annually 1 to 1.5 billion euro of tourism industry to South-East Finland and in total around 3.5 billion euro. This estimate is greatly dependant on the improvement of service offering in the regions near the border. How the potential increase can be channelled to infrastructure development depends on investment planning and funding available. Particularly for E18 and Imatra and Nuijamaa border crossing these are critical issues.

Additional investments will be needed for border crossings and passport controls. The visa free movement will put extra emphasis on border checks, and if mobile checks are carried out in trains in greater volumes this also requires more staff. At present the varying passenger volumes in trains require relatively larger volume of staff per unit than checks at border crossings.

Cooperation across the borders

Similar constraints exist across the border. Improvements and investments should be planned in cooperation to ensure that no bottlenecks emerge. In the ideal situation the services and activities across the border could form a mirror image, where passengers could seamlessly utilise services. For instance FITSRUS cooperation provides a good platform for such developments.

Development of cooperation between authorities is equally important. This means joint planning processes and cooperation at operative and administrative levels. Investments and their funding should be analysed from the viewpoint of the entire corridor and funding mechanisms such as life-cycle costs could be considered. Finally, land use planning should take into consideration the need to respond quickly to realisation of the economic potential related to cross-border tourism.

Research activities between Finnish and Russian institutions should be also endorsed. Similar study is being prepared for the Russian Federation by NIPI-RTI, facilitation of dialogue and integration of results is critical in ensuring a common vision. It is recommended that the Ministries in both countries continue to form such a vision.

Recommended actions

In short-term the monitoring of passenger and transport volumes is important. This should be connected to planning of investments. During the period a common vision and roadmap to 2030 should be formulated.

In the medium-term, required investment projects should be started. If possible, the benefits for local economy should be factored in the planning.

In the long-term, through planning and financing the goals for 2030 should be reached. This means that smart transport corridor should be supported by border crossing and passenger services ICT applications.