ROADIDEA INCO –
A COMPARISON OF NORTH-AMERICAN AND EUROPEAN DATA AVAILABILITIES AND APPLICATIONS

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ABSTRACT

The main target of ROADIDEA, a collaborative research project in the 7th Framework Programme of the European Union, was to answer the question, whether the European Transportation System is still able to produce radical innovations. And if not, what are the barriers to be overcome.

Amongst other side aspects of such a general investigation of innovation potential, the data aspect was one of the most important investigations carried out in parallel. In a dedicated data work package corresponding data availability and related aspects were analysed.

However, the heterogeneous availability of necessary data (traffic and weather) in Europe was identified as one of the main barriers for the implementation of desired services on a continental scale. This specific barrier made it almost impossible to implement similar services in different European countries and regions. When reporting this to the European Commission, the question came up, whether a free data policy – as assumed being applied in the U.S. – could solve this issue. As a minor extension to the ROADIDEA project, ROADIDEA INCO (International Cooperation Aspects) was charged with the investigation of comparable ITS services in the U.S. and Canada and underlying data. But also the other way around approach – to investigate available data and assess corresponding application and services - promised to reveal interesting relations between available data and derived applications and services.

This paper describes the results of the data source and application investigation of the ROADIDEA INCO project.

INTRODUCTION

The basic argument of ROADIDEA was that effective accessibility to all kinds of useful background information combined with advanced data fusion methods and technological information platforms with high level of standardisation are prerequisites for creation of innovative mobility services.
When discussing barriers for service implementation and shortages of data availabilities, which was and is still the most severe problem for piloting new services in Europe, the question was raised, whether a free data policy could help implementing more radical services to the transport sector. Following the spread rumour of a 'free data policy' in the U.S. the idea was born to investigate

- available data sources in the U.S. and Canada,
- its usage within methods for both transport and weather models and
- corresponding services and applications.

The goal was to investigate and compare available data sources, applied methods and services in Europe and North America. Is there a free access to North American data sources? And if so, is this directly measurable in terms of innovativeness, quality and coverage of applied services, which is finally identifiable in terms of transport system performance criteria (travel and waiting times, carbon emissions, congestion lengths) and lower numbers of transport fatalities and accidents?

Project partners of ROADIDEA INCO took part in several national and international workshops and conferences, performed two Future Scenario workshops with local experts and operators and visited and interviewed several University research institutes. The intention was to become familiar with latest ITS applications and services - both operational and under research - and to investigate, assess and evaluate underlying data sources and methods. Even though resources – especially time - were very limited and, thus, only a small number of projects and initiatives could be taken into account, general trends, similarities and differences could be considered.

METHODOLOGY

The methodology chapter is intending to briefly describe initiatives and projects considered during the ROADIDEA INCO investigation in the U.S. and to set it into relation with European projects dealing with similar topics, applying comparable data or addressing a similar research aspect.

ROAD WEATHER MONITORING

The CLARUS Network

Clarus is an initiative sponsored by the Federal Highway Administration (FHWA). As the main component of the existing National Weather Observation System (NWOS), *Clarus* has three primary motivations (1).

- Surface transportation-based weather observations will enhance and extend the existing NWOS database supporting general weather forecasting enhancing the protection of life and property.

- National collection of real-time surface transportation-based weather observations will provide for unfettered access of data for support of operational responses to weather events and their impacts.
- Surface transportation-based weather observations integrated with existing NWOS observed data will permit broader support for surface transportation-specific models predicting impacts of weather on surface transportation safety and mobility.

The intent of the *Clarus Initiative* is to demonstrate how an open and integrated approach to observational data management can be used to collect, control the quality of, and consolidate surface transportation weather and pavement condition data to augment the existing NWOS.

The main goal of the initiative is to create a robust data assimilation, quality checking, and data dissemination system that can provide near real-time atmospheric and pavement observations from the collective state's investments in road weather information system, environmental sensor stations (ESS) as well as mobile observations from Automated Vehicle Location (AVL) equipped trucks and eventually passenger vehicles equipped with transceivers that will participate in the Vehicle Infrastructure Integration (VII) Initiative.

Data: On the weather side, *Clarus* sources include Doppler radar, personal observations, weather balloons, measurements of barometric pressure, and computer models used by meteorologists. In transportation, it is the roadway surface information collected by the over 2.500 weather stations that gather data from sensors imbedded in the roadway, by roadside weather sensors, and in the future by in-vehicle technology as well.

Similar initiatives in Europe: The Standing International Road Weather Commission (SIRWEC) was originally set up in 1985 as SERWEC (Standing European Road Weather Commission). SERWEC became International in 1992 in the US, thus changing its name to SIRWEC accordingly. SIRWEC is operating as a forum for the exchange of information relevant to the field of highway meteorology. This shall include management, maintenance, road safety, meteorology, environmental protection and any other area of interest considered relevant by the Commission. From the information collected it is identifying those areas where increased and/or new research and development may yield improvements in practices, techniques, systems and methodology, to the general benefits of the art (2). Furthermore, contact is to be initiated and maintained between SIRWEC and bodies such as COST, OECD, PIARC, WMO and other bodies so as to ensure that the work of the Commission is recognised.

Availability and provision of European data, its road network penetration and the utilisation of derived information varies strongly between SIRWEC application areas. Especially data access is subject to national regulations. Besides that, most European countries providing road weather data and aggregated information via public and private weather data providers (e.g. German Weather Services DWD in Germany). As stated above, national road weather provisions mostly underlie national regulations; no common level of service has been agreed on in a European scale so far.

ROAD SITE TRAFFIC MONITORING PROJECTS

IntelliDrive

IntelliDrive is a multimodal initiative that aims to enable safe, interoperable networked wireless communications among vehicles, the infrastructure, and passengers' personal communications devices. IntelliDrive research is being sponsored by the U.S. Department of Transportation (USDOT) and others to leverage the potentially transformative capabilities of wireless technology to make surface transportation safer, smarter and greener. USDOT research is supporting the development and testing of IntelliDrive technologies and applications, to determine their potential benefits and costs. If successfully deployed, IntelliDrive will ultimately enhance the safety, mobility and quality of life of all Americans, while helping to reduce the environmental impact of surface transportation (3, 4).

The IntelliDrive system is tapping several data sources while applications providing connectivity:

- Among vehicles to enable crash prevention;
- Between vehicles and the infrastructure to enable safety, mobility and environmental benefits; and
- Among vehicles, infrastructure, and wireless devices to provide continuous real-time connectivity to all system users.

IntelliDrive provides a starting point for transportation and information connectivity and is envisioned to ultimately encompass safety applications, mobility applications, and environmental applications (3). Under the IntelliDrive umbrella corresponding activities and projects are hosted and carried out. All of these are supporting the implementation of IntelliDrive's overall goals and objectives. As being sponsored by the USDOT, it may also be considered as a strategic funding program for coordinated research, testing, demonstration, and deployment activities. The Federal research investment is targeted to areas that are unlikely to be accomplished through private investment because they are too risky or complex. Other stakeholders, including the States, the automotive industry and their suppliers, and consumer electronics companies, also are researching and testing IntelliDrive technologies and applications.

Data: To date the following data sources are used and applied within the IntelliDrive system:

- Vehicle Status Data: **Car CAN-bus data** (e.g. speed, wiper on/off, friction, lights on/off, etc.) is collected and exchanged with the system.
- Infrastructure Status Data: **Loop detectors and cameras** report the network status within observed regions and network segments. Given observations are analyzed and aggregated into travel time maps and status reports.
- Weather data: Using the **CLARUS system** road weather data is collected and exchanged with the system permanently.
- Transaction data: **Tolling information** is available. Analyzed and taking into special consideration.
- Location data: **Underlying network** topology is used for map matching given information and road status monitoring.

Currently IntelliDrive is investigating the possibility of leveraging existing vehicle fleets equipped with GPS and possibly with some CAN bus information (**FCD –** floating car data). Possible fleets include United Parcel Service (UPS), state DOT fleets (such as snow ploughs), transit agencies, and various trucking companies. This is in addition to the small fleet of light vehicles that USDOT owns and operates in the Michigan test bed.

Similar European projects:
WiSafeCar is a Eureka-Celtic project involving partners from Luxembourg, Finland, France, Turkey and Spain. The overall aim of this project is to develop a reliable wireless traffic service platform to improve traffic safety, avoid traffic accidents and provide variety of new type of services to vehicles. This objective will be achieved by means of secure data collection from vehicles and fixed stations, secure dissemination of data between vehicles, and make use of such data for real-time transport service applications. The motivation of this project proposal came from Celtic's earlier project, CARLINK. The core members of WiSafeCar consortium have been working together in CARLINK, where intelligent way of creating wireless traffic platform for public transport services was researched and developed based on hybrid networking (Mobile WiMAX, WiFi, 2G/3G) and several innovative vehicular applications (5).

eCoMove is another European Commission funded Integration Project (IP) under the seventh framework program of Information Society Technology, started April 2010. The eCoMove project will create an integrated solution for road transport energy efficiency by developing systems and tools to help drivers sustainably eliminate unnecessary fuel consumption (and thus CO2 emissions), and to help road operators manage traffic in the most energy-efficient way. By applying this combination of cooperative systems using vehicle-infrastructure communication, the project aims to reduce fuel consumption by 20% overall. The eCoMove concept rests on the idea that, for a given trip by a particular driver in a particular vehicle, there is some least possible fuel consumption that could be achieved by the “perfect eco-driver” travelling through the “perfectly eco-managed” road network. In reality, both drivers and traffic management systems fall short of this ideal, and much fuel is wasted and CO2 emitted unnecessarily. The eCoMove innovations will target the two sources of this avoidable fuel consumption: private trips and freight/logistics trips.

The aim of project **CARLINK** (6) was to develop an intelligent wireless traffic service platform between cars supported with WLAN transceivers beside the road(s). In this perspective also the WiMAX (Worldwide Interoperability for Microwave Access) network is analyzed. The primary applications are real-time local weather data, the urban transport traffic management, and the urban information broadcasting. CARLINK was conducted end of 2008.

The R&D project **CVIS** co-funded by the European Union under the ICT (Information and Communication Technologies) priority of the 6th Framework Programme for Research (7) aims to design, develop and test the technologies needed to allow cars to communicate with each other and with the nearby roadside infrastructure. CVIS’ achievements will be applied in test sites in seven countries across Europe, to increase road safety and efficiency and reduce the environmental impact of road transport.

SAFESPOT, co-funded by the European Commission Information Society and Media and supported by EUCAR, is working to design cooperative systems for road safety based on vehicle to vehicle (V2V) and vehicle to infrastructure (V2I) communication. In order to prevent road accidents SAFESPOT developed a "Safety Margin Assistant” to detect in advance potentially dangerous situations and extend, in space and time, drivers’ awareness of the surrounding environment. The Safety Margin Assistant is aiming to provide reactive driver support levels for 3 safety stages before the crash (8).

PORTAL

The Portland Oregon Regional Transportation Archive Listing (PORTAL) is the official transportation archive for the Portland-Vancouver metropolitan region. The purpose of this project is to implement the U.S. National ITS Architecture's Archived Data User Service for the Portland-Vancouver metropolitan region. PORTAL has grown into a large, complex system with a one-terabyte archive of transportation-related data and a web site with over 20 different pages featuring a wide variety of graphical and tabular displays of data. PORTAL is widely used by local transportation professionals; it has been used in the development of the Regional Transportation Plan, by the local news media, and in numerous research projects at the Intelligent Transportation Systems (ITS) Lab at Portland State University (PSU) (9). While accessing aggregated information online, registered users may download raw data directly for their own analyses and applications.

Data: PORTAL archives 20-second speed, count, and occupancy data from the approximately 600 inductive loop detectors in the Portland, OR and Vancouver, WA metropolitan region. Additionally, PORTAL stores other transportation-related data including data on weather, incidents, and variable message sign displays in addition to bus AVL and truck weigh in motion records. The ITS infrastructure in the Portland region also includes nearly 100 CCTV cameras, 138 ramp meters, transit signal priority, advanced bus dispatch system, and an extensive fibre optics network (10).

Similar European Portals and Activities: There is a huge number of local and even regional multi-modal route planning and traffic state monitoring portals in Europe. Especially for metropolis regions it seems to be mandatory to provide multi-modal information about travel times (most commonly via color-coded maps), park-and-ride possibilities, construction sites and congestion information. Some portals provide traffic forecasts; a few even implement weather information.

One outstanding example amongst thousands of portals in Europe is **www.anchb.at**, which collects and provides traffic information for road and public transport for the Austrian Vienna region. The traffic situation is constantly monitored using color-coded maps with special respect to ongoing road works, road blocks and some more available information. It is also very common to add available cameras to such map views, in order to provide visual real time information by video.
The calculation of link speeds, to be visualised as colored network elements, is based on loop detector data and floating car data (**FCD**). GPS equipped probe vehicle (also known as FCD) are permanently penetrating the traffic flow, sending their timestamp and position and, thus, allowing a calculation of link speed while taking into account actual data from high reliability and quality.

I-95 Corridor Coalition

I-95 Corridor Coalition is the only north-American initiative to be considered as an over-regional implementation for a number of federal states in the U.S. 17 federal states are joining forces to follow the vision “that the transportation network in the region will be safe, efficient, seamless, and intermodal, and will support economic growth in an environmentally responsive manner” (11). The I-95 Corridor Coalition is an alliance of transportation agencies, toll authorities, and related organizations, including public safety, from the State of Maine to the State of Florida, with affiliate members in Canada. The Coalition also provides a forum for key decision and policy makers to address transportation management and operations issues of common interest. The system is supposed to support the following areas (11):

- Travel Information Dissemination
- Coordinated Operations
- Intermodal Transportation
- Education and Training
- Electronic Payment Services
- Information Systems
- Safety

I-95 corridor coalition is linked with the IntelliDrive network and implemented in the Safe-Trip-21 initiative, which is to demonstrate how ITS technology can improve safety and enhance the travel experience using readily available wireless communications devices.

Data: Along 1.917 miles of corridor I-95 and up to 40.000 connected national highway system miles the primary source of data is **probe vehicle data**. There are a few regions in the multi-state coverage area that have some **loop detectors or radar detectors** provide by local public and private companies. The I-95 Corridor Coalition's **Vehicle Probe project** is a collaborative effort among the Coalition, University of Maryland and INRIX providing comprehensive and continuous real-time travel information to members. I-95 Corridor Coalition member agencies benefit from the Vehicle Probe project by receiving travel time and speed data to support the dissemination of travel information using 511 and websites; display of travel times on variable message signs, traffic management during incidents and performance measurement.

It has to be pointed out that above described Vehicle Probe Data (VPD) technology does not mean Floating Car Data (FCD) technology (also known as probe vehicle data in Europe). While technology and outcome (traveltime per link/observed network element) can be compared, approaches differ in terms of implementation costs, penetration rate and reliability.

Similar European projects and coalitions: **EasyWay** is a project for Europe-wide ITS deployment on main TERN corridors driven by national road authorities and operators with associated partners including the automotive industry, telecom operators and public transport stakeholders. It sets clear targets, identifies the set of necessary ITS European services to deploy (Traveller Information, Traffic Management and Freight and Logistic Services) and is an efficient platform that allows the European mobility stakeholders to achieve a coordinated and combined deployment of these pan-European services (12).

EasyWay can be compared with the I-95 Corridor only partly. The levels of implementation of real end user services, common data acquisitions and public visibility are very different. While EasyWay is considering necessary technological prerequisites and supporting the definition of legal conditions and regulations, the I-95 corridor has to be considered as an operational and applied system. The idea as such and its degree of implementation into real services should be taken as a how-to for an open European road networks solution.

Again, the main driver for I-95 Corridor Coalition success was and is that under the leadership of only one planning and administrative body (USDOT) it was possible the overcome administrative barriers and cross-border limitations.

As pointed out in several ROADIDEA reports, as long as no common availability of - at least the most necessary road traffic - data along main European road traffic corridors (TERN) is given under the governance of the European Commission, one can not expect a successful implementation of any cross border ITS services in Europe. The target for near future European service development has to be to apply similar services along European long distance routes from, as it has been achieved along 4000 miles of I-95 highways.

UNIVERSITY RESEARCH

The following sub-chapters describe some outstanding examples for university research on the field of acquisition, fusion and provision of transport related data. Besides face-to-face meetings in Seattle (Washington University) and College Park (University of Maryland) a lot of valuable talks have been made with U.S. and Canadian researchers at different workshops and conferences. Corresponding conference proceedings and workshops minutes have been studied in order to get a better insight in recent, ongoing and future activities.

Regional Integrated Transportation Information System (RITIS)

The University of Maryland's (UMD) Center for Advanced Transportation Technology Laboratory (CATT Lab) supports National, State, and local efforts to provide safe and efficient transportation systems through improved operations and management by means of research and development, technology implementation, training and education (13). The CATT Lab's RITIS system is an automated data sharing, dissemination, and archiving system. RITIS improves transportation efficiency, safety, and security through the integration of existing transit and transportation management data in Virginia, Maryland, and Washington D.C. RITIS automatically fuses, translates, and standardises data obtained from multiple agencies in the region in order to provide an enhanced overall view of the region's transportation network. Participating agencies are able to view regional traffic information and use it to improve their operations and emergency preparedness. Virtual road occupancy, calculated from actual road traffic observations, shows the actual traffic situation on road network stretches. Accidents, incidents and construction sights are highlighted with different and intuitive colour codes. Weather situations and given visibilities can be visualised; event data (e.g. parades) can be planned and managed; traffic cameras and public transport schedules are embedded.

Data: Following data sources are integrated into RITIS:

- Traffic (Loops, RTMS, ATR, acoustic, microwave, probe vehicles)
- DMS
- Event/Incident (planned events, incidents, construction, weather)
- Weather
- Transit
- FITM Plans
- GIS (Road network, terrain, evacuation routes)

During data acquisition activities UMD was challenged by the problem to deal with different DOT's data use agreements both within state and across state lines. Obviously, no common USDOT data access policy was given, which could have been taken as a regulative template for needed data use agreements.

Star Lab – University of Washington

The laboratory for Smart Transportation Applications and Research (STAR Lab) at the University Of Washington (UW) was established in 2003 in order to enhance the strength of ITS research and education at the UW (14). Major objectives of the STAR Lab are:

- support advanced ITS research;
- cultivate ITS professionals;
- explore effective solutions to transportation problems;
- provide hand-on training instruments and software applications for students in ITS classes; and
- construct a bridge between the UW and agencies of transportation practice.

Bluetooth based vehicle probe data acquisition: This traffic data acquisition using Bluetooth vehicle probes relies on identifying and matching the median access control (MAC) address of each Bluetooth device carried by bypassing vehicles for travel time data collection. In this respect StarLab is focussing on a more general technological research regarding the inherent error rate of these data collection devices. Furthermore, the use of multiple devices in tandem to improve results is to be investigated. So, Bluetooth MAC address-based travel-time sensors developed by StarLab are being compared with the standard automatic license plate recognition (ALPR) devices for travel time data collection. StarLab researches see a great potential to apply this approach for cost-effective travel time data collection.

Drive Net: Drive Net is an open source platform for region-wide, web-based transportation decision systems which adopts digital roadway maps as the base and provides data layers for integrating multiple data sources. Digital Roadway Interactive Visualization and Evaluation Network (DRIVE Net) enables connections and interoperability of the separated database systems through properly designed and implemented ontology and taxonomy of the currently isolated data sets. The system allows exterior data to be plugged into an existing data warehouse, allowing for previously difficult multi-field data analyses to be undertaken through a user friendly, abstracted, interface (15).

DRIVE Net is accessing the following data:

- WSDOT (Washington State DOT) freeway loop detector data,
- City of Bellevue arterial traffic data,
- GPS data for truck fleets, and
- Washington State Incident Database

Basic functionality of DRIVE Net includes the ability to select and download archives from the STAR Lab Data Mart, visualizing real-time and historical observations both spatially and temporally (e.g. user customizable traffic flow maps), optimised routing based real-time traffic and a modular framework that will be added to as needs arise.

CONCLUSIONS AND RECOMMENDATIONS

First of all, it has to be pointed out, that the transportation systems as such and, thus, corresponding data aspects of the U.S. and Europe as a whole can hardly be compared. The U.S. federal states can easily create cooperation networks and apply ITS initiatives and programs under the ‘umbrella’ of given public managing, planning and funding authorities – such as U.S. Department of Transportation (USDOT) or Federal Highway Agency (FHWA) – without cultural and regulative barriers. As for transportation data availability, the European Union still consists of 27 separated member states with more than 20 languages and – even more important – a huge amount of different cultural, historical and political backgrounds, and – when it comes to transport related data aspects - regulative policies.

While investigating the U.S. transportation system the following data related conclusions are to be highlighted:

- No 'free data' situation
  Even after getting familiar with only a few aspects of the U.S. transportation system the Author is claiming that no 'free data' policy is given in the U.S.
- Metrics
  When talking about and comparing transport data, its quality, its quantity and the estimation of impacts for data related applications for the performance of the entire transportation system, clearly defined metrics are needed. While well defined metrics for road weather data are given, quality, precision, and reliability of traffic data acquisitions very often cannot be described with intuitive metrics. This is challenging data related initiatives and projects but also traffic data bases and warehouses. Big efforts and expenditures are made in North America as much as in Europe. Corresponding planning and managing bodies and authorities should join forces and synchronise standardisation initiatives in order to create a common set of reasonable metrics.
- Local Solutions for local problems
  Mainly local solutions for local problems are given in both the U.S and Europe. Conversely, this means that an operational trans-regional approach to tackle similar issues globally is mostly missing on both sides of the Atlantic Ocean, even though recently learnt and promoted lessons in other regions are widely taken into account when setting up new local solutions.
- Federal and National data acquisition:
  Data acquisitions focuses and strategies differ from state to state in Europe and the U.S. – following national and federal oriented strategic decisions. In Europe no minimal availability of data necessary for elementary ITS services is given in a continental scale. So, cross border implementation of services along long distance routes throughout Europe are barely applicable. The same only partly applies to the U.S. Nowadays a more strategic direction towards common data coverage is given by regulative authorities (USDOT, FHWA, etc.). While corresponding decisions are made by only a few authorities, these decisions are more reliable but also less flexible. Once pursued strategic directions can not be easily corrected. Due to different national strategies in Europe, development paths are more diverse and competitive.
- Data regulations and policies:
  With the USDOT CLARUS initiative on road weather data one aspect of transport related data can be considered as "free". But, this advantage is lightly used up by regulations, public and private road traffic data providers (have to) saddle their data with. The European Commission, as the roofing European body, is working on corresponding recommendations, which could clarify data access regulations for EC member states. But, to date it is unknown how to implement those recommendations and how to convince member states to make those recommendations to national law.
- Actual versus historical data:
  While latest European research activities are relying mainly on the combination of real-time road traffic observations (FCD, cameras, satellites, etc.) and large historical data bases, collected from the same or similar data sources, U.S. research only now starts to consider real time data acquisitions (Bluetooth FCD, camera imaging). In the U.S., mostly average travel time and performance measurement figures, derived from large historical data bases, are in use for traffic estimating and supporting decision making. The drawback of this approach is that actual events can hardly be observed using only historical data. For "normal" road conditions average patterns may the best choice, but, in order to enable for instance Traffic Management Centres (TMC) to notify and react automatically on actual events (e.g. accidents and incidents), also real-time road side observations are essential.

- FCD versus Probe Vehicle Data
  FCD (floating car data) is used intensively in Europe's large cities and agglomeration areas where GPS equipped fleets (Taxis, delivery trucks, buses, etc.) are producing a fairly good ground truth for up-to-date traffic monitoring. Nowadays first implementations allow sending back information, based on FCD merged with a variety of corresponding data, to the fleets. So, the operational circuit is closed, which could be (and partly is) used for next generation ITS services using C2C (car to car) and C2I/I2C (car to infrastructure) technologies.
  U.S. FCD is very often equated with Vehicle Probe Data. U.S. research laboratories and even large data related initiatives (I-95 Corridor Coalition) are collecting Vehicle Probe Data using Bluetooth MAC addresses of mobile devices such as phones and PDAs. The most obvious limitation of the technology is that only on observed road network elements data collection is possible. Large efforts and technique based expenditures are needed, while new cars are more and more equipped with GPS hardware. An exhaustive observation using "Bluetooth FCD" is hardly achievable. By now, GPS FCD is only used with very small pilot fleets for feasibility studies (USDOT fleet with a dozen of cars, snowploughs).
- Clarus Initiative
  A big step towards free data availability has been made with the CLARUS road weather data system covering a major part of the U.S. and a minor but augmenting part of the Canadian road network. Data are free available both offline and online. For data research purposes offline data sets may be downloaded; for implementing online data into value added services and applications several data base interfaces are defined and intensively used by a variety of public and private service providers. Unfortunately, when considering the transportation system as a whole, road weather data is an important but minor aspect when targeting a comprehensive and reliable description and monitoring of daily road traffic conditions.

During ROADIDEA INCO project evaluation the following concrete steps and actions have been recommended to the European Commission:

- Integration of ROADIDEA INCO results, expertise and partnerships into existing co-operation activities, working groups and task forces (e.g. EU-US Co-operation steering group, technical groups and working group).
- Pro-active continuation and fostering of established contacts with concrete pilot and co-operation projects. When presenting projects results to the DOT officials in Washington special attention has been raised with the description of European FCD based applications. The need and concrete implementation aspects of GPS-based FCD (Floating Car Data) have been intensively discussed.
- Establishment of special interest sessions at international ITS Conferences (e.g. TRB Washington, ITS World). Latest interdisciplinary research activities and findings should be exchanged and discussed with special respect to trans-Atlantic co-operations and synchronisation of research directives.
- Innovation seminars joining EU and US researchers and decision makers in order to continue the success story of creating radical innovations for the transport system in a trans-Atlantic scale. New service ideas are to be created using. Results may be integrated into new research and implementation funding schemes and strategic development paths.
- Synchronisation and harmonisation of European and US research agendas and directives.

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