

Integrated RWIS in the Central European Territory

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The Central European territory is a geographical region with dense road traffic and very diverse landscape. The future European integration will certainly increase the demand for a working road information system. Essential part of the information system is the road weather information as a major factor influencing the road transportation. To be able to organize such an international road weather information system it is necessary to solve a number of basic problems. The following paper brings information about the approach to this problem by the road authorities and meteorologists in the Czech Republic and Germany.

A group of road weather professionals agreed on launching a Pilot project in the border region between the Czech Republic and Germany (Bavaria). The pilot project was named Sumava, same as the mountains in this area on the Czech side.

The primary tasks of the project are following :

1. Creation of road weather stations network in the region
2. Organizing a working data acquisition system for different systems
3. Mutual information exchange for issuing a regional road weather forecast
4. Multiuser and multimedial information platform

The above mentioned tasks are currently handled in several working groups by experts from both countries. Most of the topics are valid for applications in other regions. This brought us to report on them in this presentation and maybe open a fruitful discussion among the SIRWEC community.

1. The Road Weather Stations Network

On both sides of the border in the region there is a number of existing installations of road weather stations from various producers and equipped with different sensors. There is no doubt that a good working network of road weather stations is a great contribution for the road status detection as well as the road weather forecast. However for a precise road weather forecast there is a certain need for precaution when using the data. Experiences from the past show, that it is very important to choose the road weather station form a site, which is representative for the area (the scale depends on the diversity of the landscape). In any case it is important to respect the climatological characteristics of the region when choosing the site. In the case of a new installation it is obligatory to complete a climatological survey prior to the installation. Very often the sites for road weather stations are choosen on places with frequent occurrence of hazardous road weather conditions for the traffic (i.e. buildup of black ice etc.). In the case this is the only criterion and the weather forecast is based on the observations from these sites, the results can be very disappointing. The national weather

service has its own network of meteorological stations (automatic and manned). The availability of data from them is also a significant contribution.

The conclusion on this topic:

- Survey of the existing road weather stations in the region.
- Sorting the current installations into categories with respect of ability of accessing the basic meteorological data for regional forecast.
- Selection of new sites which are essential for the regional road weather forecast.

2. Data acquisition system

This is a major problem, since we are working with different systems made by a variety of producers. The systems usually use various communication systems to acquire the data from the remote sites to the places of their visualization and/or presentation. Some of the stand-alone systems used for detection of icing conditions indications have limited applications and often show only the current road status (the data from these are used only as complement if there is any on-line access to them). In some cases the hazardous conditions can be reported from the road maintenance dispatchers consoles. The best solution is to have an unlimited access directly to the remote site, however this is in most cases possible when only one system is used. Since the telemetry data format is a part of the system it is very difficult to extract them directly. The raw data are also frequently processed in the place of data acquisition. Almost all the systems currently in service are using the PC as a standard tool for data acquisition and visualization. The data formats however are not unified. This is why there we have called out an initiative that will allow to transfer the road weather data into a unified data format. The proposal came from the German colleagues . The availability of data in the unified data format is surely a great help, especially for the meteorologist when issuing the regional or site-specific road weather forecast. Another problem is data communication. Again there are many approaches usually depending on the used technology. Some of the systems allow only site to center data collection based on cable, dial-up telephone links, microwave, radio, radio networks, GSM, etc. Some of the more sophisticated systems allow the data collection into one server and redistribution of the information to the users in different ways. And some of the systems are ready to transfer the data after being collected and preprocessed in the point of data acquisition. This makes the collection of data a quite difficult task. The easy way is when there is an internet access to the data acquisition points, however this is not the case in all places and sometimes there has to be a data bridge from the remote site to place with an internet connection. The type of connection has a significant effect on the data availability, the places are seldom connected on-line. In most of the cases there is a dial-up connection with a conventional telephone or GSM modem. This requires a good data collection system with an exact connection schedule. In praxis this is one of the most critical problems because there has to be a unique solution for every data collection point. A great advantage is when the system does consist of one or only few different products, however that was not the case in our pilot project.

The conclusion on this topic:

- Multilevel survey of the existing road weather stations is essential.
- There is a crucial need of unified road weather information data format.
- The success of the system strongly depends on reliable communication system.

3. Mutual exchange of information for the specialized road weather forecast

This is one of the most important points of the whole project. The meteorologists can exchange data and other sources of information to increase the quality of their road weather forecast. First of all there is a need of mutual unrestricted access to the database of all data essential for providing exact weather forecast. The forecast must be short term (possibly for the next 6 hours with overlapping validity) with outlook for the next 24 and 48 hours. The forecast must be issued for local, subregional and regional scale and in “line form” for some routes (i.e. highways, motorways etc.). The Czech and the German central forecasting centers as well as the regional branches in west Bohemia and Bavaria are willing to exchange not only the information but also the applied methods used in road weather forecasting. Very important is the presence of the people responsible for the road maintenance. They are providing the important feedback for the forecast editors. The weather forecast must be able to give clear answers to the principle frequent questions of the road maintenance service. Only such system can provide service actually applied in the road maintenance technology. While consulting the topic with the end users there is a frequent request for emergence of an expert system based on meteorological data and information inputs providing direct information for proper use of the relevant technology (i.e. spraying and salting volumes on different routes etc.). A part of the project is establishing an on-line conference on internet connecting the forecasting centers, they will be able to brief on the meteorological situation and exchange warnings on hazardous meteorological phenomena. This mutual cooperation may result in developing of new “products” on the field of road meteorology. There is a very good possibility of implementing the on-line data into existing models of different scales. Also application of the road related databases as thermal mapping and sky aperture will bring more accuracy into the forecasting methods. We intend to carry on a virtual workshop for the meteorological techniques used in road weather forecasting. The new “products” will be released for direct evaluation of the end users in order to increase the intelligibility of the system.

The conclusion of this topic:

- Providing effective platform for mutual information exchange among the weather services.
- Establishing a virtual workshop with direct feedback of the end users to the products.
- Development of “expert systems” with information for the road maintenance technology.

4. Multiuser and multimedial information platform

Crucial importance of the whole system is having superb data dissemination system. In fact this is the only part of the system affecting the end users. Since the potential end users have different demands on the information content and recruit not only from the road maintenance centers the system has to be very flexible. Very important is not to rely only on one dissemination system. The experience shows that it is very important to provide the information with a certain level of redundancy. If one system fails there is always a substitute containing the basic information disseminated by a different media. In case of the Czech Republic, the national road weather information system is based on internet and teletext transmitted by the public national TV Channel with country-wide signal coverage. This system will be employed in the pilot project. Besides we prepare a special messaging system with the use of SMS messages and pager text messages. For the needs of the road maintenance the road weather information will be included in the dedicated trunk radio network. The efficiency of the road weather information system is considerably increased by applying more dissemination channels. System relying solely on one dissemination system is very vulnerable. Within the pilot project we intent to test such dedicated system.

This system is capable of providing adjacent products resulting from the road weather information. The users of this information are presumed to recruit from transport and logistic companies, travel agencies and not least we see a major contribution for the traffic safety.

Conclusion on this topic:

- Establishing a multi user information dissemination network
- Providing dissemination channel redundancy
- Providing user-specific products

Final Conclusion :

As a first result we have established working groups dealing with different topics with experts from both countries. In this phase of the Sumava project the network of existing road weather stations is being adapted for data acquisition and first installation of dedicated new road weather station on weather significant site on international E route is completed. We expect to have the complete system working in the winter season 2001/2002. Further information on the progress of the project will be published on the web site of the Road and Motorway Directorate of the Czech Republic www.rsd.cz and the Czech hydrometeorological institute www.chmi.cz with links to other contributors. We have had talks with other neighbouring countries about the possibilities in cooperation on this field. On this place we would like to encourage anybody in the Central European territory to join this mutual effort.